AMERICAN

JOURNAL OF MINING,

Milling, Oil Boring, Geology, Mineralogy, Metallurgy, etc.

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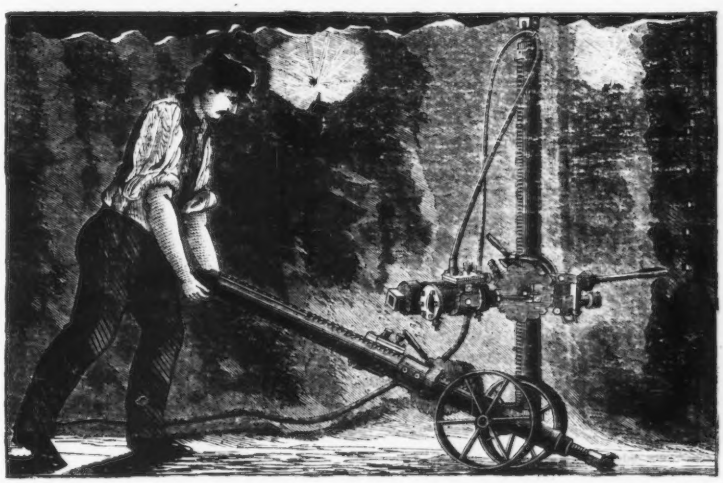
NEW ROCK DRILLING MACHINES.

Herewith we present an excellent illustration, made by one of our artists, of the latest style of these machines, built expressly to work in confined spaces. They are very compact, measuring—independent of supporting column, etc.—30 inches in length by 12 inches breadth and depth, and weighing only 250 lbs. One man can move and adjust them to the work, as seen in the engraving. The supporting column is held firmly in place by setting out the jack-screw, and thus bracing it between the top and bottom of tunnel, or the sides of shaft, and the machines are raised and lowered by a gear working in the rack on side of column, while the attachments to the column form a universal joint and allow the machines to work at any angle. They are automatic; one engineer can attend to a gang of four or five, working on the same face. Six of them can be worked in a heading four and a half by six feet; and in a shaft six by twelve feet, eight of them can be worked at once. In a railroad, or other large tunnel, an increased number of machines can be operated with, being supported and moved upon a carriage running on rails.

In the Mount Cenis tunnel no less than nine of the comparatively cumbersome French machines are used in the heading, which measures eight by eight feet. The simplicity and freedom of this new American Rock Drilling machine from liability to break any essential part, must commend it to parties remote from repair shops. The Patentee invites the closest scrutiny of mechanists, engineers, miners, and all interested in rock work, and for their benefit we may mention that one of these machines can be seen at work any hour of the day, drilling into a block of Rockport (Mass.) granite—the hardest granite known. The blow is struck by the drill being projected by the reactive force of an india rubber spring against the rock, the drill being as free from the working machine at the instant of striking, as an arrow shot from a bow; 300 hundred blows per minute can be given with the utmost force the steel-drill point can bear. The cross-head to which the drill is attached is drawn back; and thus compressing the spring by a cam rivetted directly to the piston rod of an oscillating cylinder, the drill point has an automatic turning motion, and the entire machine an automatic feed, self-regulating, according to the varying hardness of the rock; the machine working equally well with the same adjustment when drilling on flint or on granite, cutting two inches deep per minute, or on mica, slate, sandstone, or other softer rocks, cutting four and six inches per minute. They drill equally well at any angle, and with them holes can be put in the most difficult places with great facility.

The patentees claim that they are the only power drills that have ever done any regular work in this country, excepting, however, the old fashioned vertical drills—their larger machines for outside cutting, having been worked for several years on railroad and canal excavations, operated by four-horse engines drilling four, six and eight-inch diameter holes, and doing the work of fifty men. They also claim that theirs are the only machines now known that can drill other than vertical holes on regular work without continual breakages; the other machines, without an exception, feeling the concussion of the blow in their most vulnerable points, and requiring constant repair. Rock-drilling, it is claimed, can be done with these machines for one-tenth the cost of hand labor, and in one-tenth the time. Although the patentees have had their larger machines—driven by steam—at work for several years, and also their hand machines for mining, it is only lately that a suitable power for work in mining has been utilized. Compressed air has been successfully employed for over three years in the Mount Cenis tunnel, and for eighteen months in English mines, and the past year in Pennsylvania. The New York Rock Drill Company having lately perfected and brought into use the present machine, containing several novelties, they are prepared to supply all demands for machines of every sort, as per their advertisement in another column. The Company are prepared to furnish machines with gangs of drills for splitting granite, marble, etc., also channelling machines for marble, etc., when blasting is to be avoided. They also have machines for cutting "bearing in" in coal; they also manufacture the Gardner Patent Drill Point, used in their machines, and especially desirable for sinking oil wells, making round holes, requiring no reaming, and cutting faster than any other point. Miners, railroad contractors, engineers, and all interested, are invited to see the mining drill operating daily in New York, at the machine shop of Sterling & Kerr, 344 and 346 West Twenty-fourth street—West of Tenth avenue.



GARDNER'S PATENT ROCK DRILLING MACHINE FOR MINING PURPOSES.

DRIVEN BY STEAM OR COMPRESSED AIR. G. A. GARDNER, PATENTEE, NEW YORK.

Coal Supply—Interesting Figures.

At a recent meeting of the Paris Société des Ingeneurs Civils, M. Simonin presented an interesting "note" on the coal supply question. Endeavoring to take account of the probable duration of coal in the world, M. Simonin deduced statistics, showing that during the last half century the production of coal has doubled nearly every fifteen years in Belgium, France and England; every ten years in Prussia, and about every five years in the United States In support of this opinion M. Simonin cited the following data: In England, the production was, in 1852, 50,000,000 tons, while it amounts, in 1864, to 93,000,000, having almost doubled in twelve years. In Belgium, the extraction amounted, in 1845, to 3,500,000; fifteen years later—that is in 1860—the same country had attained a total of 7,500,000 tons, or more than double; while in 1863 the production had been further carried to 10,000,000 tons. In France the production was, in 1843, 3,700,000; sixteen years later—that is in 1859—it had reached 7,500,000, while in 1865 it had further increased to 11,000,000 tons. M. Simonin thinks that the process of doubling the production will probably be effected in future in shorter periods; he considers that he is justified in assuming this, not only by the results indicated, but also by the necessarily progressive developments of industry. Twelve years since, engineers, in endeavoring to render account of the probable duration of known coal resources, and basing their opinions on the then existing totals of consumption, did not anticipate the exhaustion of coal before 1,000 or 2,000 years; but now, with the theory of doubling in the production every fifteen years, M. Simonin looks for the exhaustion of coal supplies of England in a period of two centuries only. In support of this conclusion, M. Simonin pointed to the opinions enumerated on the subject by Sir. W. Armstrong in 1863, and Sir Roderick Murchison in 1865. M. Simonin does not think that the French and Belgian collieries will have a longer duration than those of England; the coal fields of the United States may, in consequence of their greater extent, last five hundred or perhaps one thousand years, but on the whole, M. Simonin foresees the exhaustion of all the coal resources of the globe.—*London Mining Journal.*

Nitro-glycerine for Blasting.

The *Berg und Hitteam'nnische Zeitung* states that among other disadvantages of Nobel's nitro-glycerine is the fact that it freezes at a temperature very probably above 92 deg. Fahr. It is said that even at a temperature of 43 deg. to 46 deg. Fahr., the oil solidifies to an icy mass, which mere friction will cause to explode. It is probable, however, that the freezing point of the oil lies somewhat lower than is here stated, though as yet no exact determination of the freezing point of the oil has been made. A newspaper from Hirschberg, in Silesia, gives a sad account of an accident caused by the frozen oil exploding by friction. Nitro-glycerine is there being used in making a railway tunnel. It was kept in glass vessels, packed in straw and placed in baskets, each vessel containing one-fourth to one-eighth of a hundred weight of the oil. For several days the oil had been frozen. It was carefully handled, and pieces were separated by means of a piece of wood and put into the bore-holes, and it was found that the frozen nitro-glycerine exploded quite as well as the fluid. One day an overseer at the shaft hit on the unlucky idea of breaking into pieces with a pick a seven or eight pound lump of the frozen nitro-glycerine. The blow caused the mass to explode, and the unfortunate man was blown up into the air, and fell back into the shaft, some forty or fifty feet deep, while two workmen who were making cartridges a short distance from him luckily escaped with slight injuries.

Desulphurizing Coal.

Mr. Charles F. Dennet, who for twelve years was the active agent of the Colt's Fire-arms Factory Company in this metropolis, is about introducing a new method for the treatment of coal, which has been pronounced a decided success. The coal prepared by the new process, which is very simple and cheap, is said to be far superior to coke for melting iron, etc. A much hotter fire can be made with it than with coke. Cast-steel heated by coal thus treated has been welded without the use of borax or other ingredients. Pig-iron which has proved too hard, has been found to yield and produce as good work as turned out with some of the best brands of iron. Crystallized iron, after melting once or twice in a cupola with the desulphurized coal prepared by the new art, has been found to work exceedingly well. The whole apparatus and ingredients to treat 100 bushels of coal can be put up for from £5 to £10, and it is stated that 60 bushels prepared by this process give as much heat as 85 bushels of the best coal not so prepared. The coal burns with a bright and violent blaze, and for family use effectually gets rid of the smoky, smouldering fires, and substitutes one of a bright and cheerful character. To smiths and manufacturing establishments, where large and strong fires are kept up, it is proposed to grant rights for usage at such low rates as to insure its general adoption, and do away in a great measure with the smoke nuisance that is so injurious everywhere.—*Mechanics' Magazine.*

Testing Mineral Oils.

The mineral oils used for illuminating purposes are usually tested, either by directly measuring their inflammability or by determining their density. Both these methods are inconvenient, and MM. Salleron and Urbain propose to substitute for them the measurement of the tension of the vapor of the oils—the tension of the vapor of any oil being of course proportional to its volatility, and therefore to its inflammability. In a recent communication to the Academy of Sciences of Paris, these gentlemen describe an apparatus by which the tension of the vapor of a mineral oil may be very readily determined, and they accompany this description with "a table of the elastic forces of one and the same oil taken as a type, so that knowing, on the one hand, the tension of the oil to be tested corresponding to a given temperature, and, on the other, the tension at this temperature of the typical oil, by comparing these numbers the value of the specimens examined can be deduced." This method is simple and convenient, and at the same time much more delicate than the methods previously in use.

Curious Scientific Experiment.

According to the Paris correspondent of the *Chemical News*, M. Cauderay has recently described a very interesting experiment. He introduces an electro-magnet into the circuit of a galvanic pile, and breaking the circuit at any point, places the ends of the two conducting wires, separated the one from the other, in a box containing metallic filings, such as silver, copper, brass, or iron. The metallic particles will, of course, complete the circuit. If, now, one of the conducting wires be slowly raised, a small chain, formed by the juxtaposition of the metallic particles, will be drawn out, and if the experiment be made with great care, every particle in the box can be drawn out in one long chain. The author states his opinion that the adhesion of the particles is not due to magnetization, but it is the result of a sort of autogenous soldering by a superficial fusion of the metallic particles. The same author has shown that metallic filings offer very great resistance to currents of dynamic electricity, and upon this principle constructs a new and very cheap rheostat.

Mining Summary.

Nevada.

The Comstock.—From recent Virginia City correspondence of the S. F. *Bulletin*, we make the following interesting excerpt: "The Hale and Norcross Mine is situated between the Savage and Chollar-Potosi companies' mines, and apparently upon a *break* in the lode, for both the Savage and Chollar-Potosi companies have explored fine deposits of ore in their mines, while the Hale and Norcross, until recently, have never met with encouraging prospects. The ore explored is in the 700 feet, or lower level of this mine, about 100 feet north, and about 340 feet east from the bottom of the 250 feet deep incline, which connects with the vertical engine shaft at the 535 feet level. This incline follows the dip of the lode at an angle of 45 deg. east, and presses through a diorite and carbonate of lime formation which lies between the west clay wall of the lode and the felspathic greenstone composing the solid foot wall, or Mount Davidson rock. From the top of this incline a drift is run directly east a distance of about 80 feet, showing the west clay wall, a short distance east from the incline, and exploring part of the lode some 70 feet across. Here water prevented further drifting for a time, and a drift was commenced in the lode about 40 feet east from the foot of the incline. This drift was continued and run about 160 feet south into the Chollar-Potosi Company's ground. No pay ore was met with until they had drifted some distance past their south line, and at the same time Hale and Norcross stock went up from $400 to over $1,000 per foot, the company and outsiders being given to understand that the ore which was hoisted to the surface and choice pieces of which were sent to the company's office, came from the Hale and Norcross mine —"over the left." The fact "long known to certain parties," that the ore found was altogether in the Chollar-Potosi Company's mine, soon became public, and the consequence was that Hale and Norcross stock went down with a crash below the old standpoint of $400. It was not two weeks after this extraordinary development that the company concluded to exchange superintendents, and accordingly S. Moore, the then foreman of the mine, was chosen to superintend the company's mining affairs. Mr. Moore, having charge of the mine, found the ground south of the east cross-cut pretty well explored, and concluded to explore the north mine. A drift was at once commenced about 39 feet from the foot of the incline, and run north to within about 90 feet of the Savage Company's south line. From here a drift was run a short distance west and the foot wall of the lode was explored. From this point a drift was run directly east some 340 feet across the lode, and it is in the east end of this drift that the real discovery has been made within the last month. The lode as explored by this cross-cut is about 340 feet in width, measuring from foot to hanging wall—the western 250 feet exploring a worthless mixture of vein matter, while the eastern 90 feet press through a body of quartz, of which about 18 feet is fine chloride of silver ore, paying from $40 to $50 per ton on an average. This stratum of ore corresponds in character and appearance with the valuable deposit of ore found in the eastern and bottom works of the Savage mine, which is about 700 feet north of the Hale and Norcross north cross-cut. As this body of ore in the Savage mine, "commonly known as the North Potosi chimney," has a southerly dip, and is explored by the North Potosi north branch tunnel and cross-cuts, at a depth of nearly 300 feet, it was reasonable to suppose that the Hale and Norcross would get it at a great depth, and this company have evidently struck the top of it in the crescent above referred to. There can be no reasonable doubt that the stratum of quartz explored by the North Potosi north branch tunnel and cross-cuts, is the same as the deposit of quartz, and one which has recently been developed in the 700-feet level of the Hale and Norcross mine. I come to this conclusion for several reasons, the chief ones being—1st. That the stratum of quartz traced in the North Potosi works corresponds with that in the north cross-cut of the Hale and Norcross. 2d. It lays against the hanging wall of the lode in the North Potosi works as well as in the Hale and Norcross; and 3d. Its dip as shown in the North Potosi would bring it about where it is now found in the Hale and Norcross, say about vertically under the Mechanic's Mill and south of the Gould and Curry Bonner shaft. There appears to be a large mass of porphyry lodged in this part of the fissure, which runs in a point north and south near the Savage and Chollar-Potosi line, separating this east part of the lode from the west, thus crowding this stratum way east, and hence the extraordinary width of the lode from wall to wall at this point where the porphyry, "commonly termed horse," takes up the greater part of the fissure. If I am to judge from developments made in some parts of the great silver veins in Central Mexico, at a similar depth, I conclude that the great horse found in the Hale and Norcross mine will run out entirely at no great depth below their present 700-feet level; that the foot and hanging walls enclosing the lode will come closer together and become more regular as depth is attained; while a well defined body of ore will no doubt fill the fissure from wall to wall. At present the company is busy exploring the newly discovered ore deposit north and south, and also towards the surface. This deposit of ore is now explored and cross-cut at a distance of over 80 feet north and south. The ore strata, with the quartz lying to the west of it, has all the appearance of making a fine and very extensive body of valuable ore in the next level below, and we may reasonably expect that Hale and Norcross will, at no distant day, occupy a most desirable part of the great Comstock lode. Of course the present shaft, incline and hoisting works are not in proper place for much deeper and convenient working of the mine; though as the Savage and Chollar-Potosi companies are both sinking shafts of large dimensions, and putting up heavy hoisting apparatus and pump, the Hale and Norcross company can no doubt explore their mine to a desirable depth through one of these shafts, and for comparative little expense too. . . . . The winze sunk on the North Potosi chimney in the Savage Mine has also improved very much within the last week. The ore, in drifting about 30 feet south and east from the bottom of the winze, is coming in fine, and is of much the same character and quality as that found in the Hale and Norcross lowest level. The future prospects of this company are certainly most promising, and it is to be hoped that they will soon get rid of the black mailing lawsuits which are now pending. . . . . The "strike" announced some time ago in the Sierra Nevada Company's mine is of little or no importance. The small seam of ore disclosed is in the 130 feet level of the mine, and about 300 feet north of the engine shaft. This ore was long known to exist there, and is therefore nothing new. Had it been found in the 4 10 or lowest level of the mine, it could then be regarded as being of considerable importance. . . . . On Gold Hill also, some of the leading mines have lately disclosed valuable and extensive bodies of ore in deep levels. The Yellow Jacket boys have partially explored a stratum of ore several feet wide in the lower level of the south mine. This ore is found in the drift west from the engine shaft, lying against the hanging wall of the lode. The company have over 200 feet of unexplored ground between this cross-cut and the next claim south; and as they are now vigorously exploring south, there are fair prospects of a decided improvement in that direction, for we know that the Kentuck and Crown Point mines both show fine ore on nearly the same level with the Yellow Jacket. . . . . The Kentuck has a length of about 90 feet on the course of the lode, and is situated between the Yellow Jacket and Crown Point mines. The extensive deposit of ore found in this mine some weeks ago is in the bottom of the vertical whim shaft, at a depth of about 270 feet. The ore found is the genuine black sulphurate and chloride of silver ore. It is of a fine quality, and no doubt will pay well. The northwesterly dip of this *bonanza*, or rich deposit, would plainly indicate that its extension will be found in the Yellow Jacket south mine, and judging from the lay of the ground the chances are in favor of an improvement further north. . . . . In the Crown Point Company's main 300-feet-level—west of engine shaft—the extension of this same ore deposit is found. The drift which cross-cuts the ore at this point shows it to be about 15 feet in width, and further explorations north and south show it to be already over 200 feet in length. The Crown Point Company are doing quite well, and I am informed that they have now over $16,000 on hand which is to go to the dividend account, and a dividend may be expected before two months are past. . . . . New strikes in the deep levels may now be expected to be made within the next three months in nearly all the leading mines here. . . . . As to other mines: The Overman Company are busy at work driving their 600 feet level west and north of engine shaft, and they have good hopes of finding ore soon. The Belcher expect to make a strike every day in their fourth and fifth levels west and north of engine shaft; but so far they have met with not the least encouraging prospects. The owners of the Confidence mine had enough of confidence left to pay a healthy little assessment of $300 per foot on their stock. The Empire and Imperial are unchanged. Both are preparing to sink and open out for deeper levels. In the Exchequer they are occasionally troubled with water, but they expect to be able to overpower this fatal agent, and proceed to prospect their mine far down in the bowels of the earth without a pump. In the Bullion mine they are drifting at a depth of 680 feet, and they expect to strike their lode east of the engine shaft. The Chollar-Potosi are doing good substantial work, and they will soon be enabled to take out more ore from their mine than ever before during its history. The 487 feet level drift is driven about 180 feet west of the new engine shaft, and it is calculated that within the next three weeks they will reach their lode. The new shaft will soon reach the vertical depth of 600 feet, when another level will be opened at once. The fine new pump and hoisting works are now completed, and can be set to work at any time. Within the next three months this company will be able to commence

business on a grand scale. . . . . In the Gould and Curry mine everything goes on satisfactory under Louis Janin, the company's superintendent. On last Christmas day, it is said, he struck it rich—richer no doubt for him than he will ever be able to strike it in the company's mine. A few days after this, he became so good-natured as to offer the Gould and Curry Company a Christmas present in the shape of $60,000, which, of course, "although unexpected," was cheerfully accepted. In the 430 feet level of the mine, west and south of Bonner shaft, the lode is improving; and further explorations will no doubt develope deposits of pay ore. There are a few mines here that will have to change their superintendents, and one its president. Not long ago I met the Superintendent of the Gould and Curry a-foot in a snow storm, far distant from the mine, attending to the business of the company. He keeps no fast horses at the expense of the company, and what is more reprehensible, he has changed the mine from a non-paying mine to a dividend paying mine, and from what we see, has the welfare of the mine at heart. This will never do. It is vulgar. Other officials will have to do the same thing. . . . . The Ophir mine continues to produce some fine ores taken from the fourth abd sixth station levels. In the ninth station level there is nothing new. The south drift has now reached a point about 80 feet north of Central shaft. Operations are progressing most satisfactorily. . . . The following comparative statement as to the mines of Virginia City and Gold Hill, is from the Gold Hill *News*:

VIRGINIA MINES.	No men employed.	No. tons ore per day.
Ophir	45	30
California	6	10
Gould and Curry	245	215
Savage	176	90
Hale and Norcross	30	40
Chollar-Potosi	160	90
Total	662	475

GOLD HILL MINES.	No men employed.	No. tons ore per day.
Bullion	28	—
Exchequer	20	—
Alpha	50	75
Imperial	75	150
Bacon	30	75
Empire	49	65
Eclipse	27	40
Stevenson	27	20
Consolidated	38	100
Pioda	16	60
Challenge	48	50
Confidence	41	55
Burk and Hamilton	9	10
Yellow Jacket	180	175
Kentucky	11	10
Crown Point	75	75
Total	724	960

Excess of men employed in Gold Hill over Virginia 62

Excess of ore taken taken out in the Gold Hill mines over Virginia (tons) per day 485

Supposing this ore to be worth $30 per ton, the amount taken from the Gold Hill mines daily, would amount to $28,800; per month, $864,000 The amount taken from the mines of Virginia per day, would be, by the same estimate, $14,250; per month, $437,500.

Excess of Gold Hill over Virginia per day . . $14,550

Excess per month 437,500

The total amount of ore taken out in Virginia and Gold Hill, per day, is 1,435 tons; per month, 43,050 tons. Value per day, $43,050; per month, $1,291,500. In estimating the productions of our mines, we have not taken any outside of the two cities. The Belcher, Apple, Overman, and Uncle Sam are all taking out pay rock, as well as several others.

Mammoth.—A Reese River paper says: "On Tuesday last, Mr. Evans, of Mammoth District, came into the office, and showered upon our table, from a large buck-skin wallet, several silver bricks, which, though small in size, were none the less valuable, as evidences of the richness of the mines of Mammoth District. These "specimen bricks" were obtained by a rude process of reduction, the ore being worked in a quicksilver flask, then baked in a common bake oven, and also amalgamated in an oven. The following is the result of the working: From eight pounds of Silver Cloud rock, there were 3¾ ounces bullion obtained. The Silver Cloud is rich in silver, and also contains a large amount of base metal, and in order to save the silver requires skilful working. From two lots of Almaden rock, of 20 pounds each, there were obtained 2⅜ and 2¾ ounces bullion. From the General Average claim, 20 pounds of rock, 3⅜ ounces. This was fine-looking bullion, and we think shows a good "general average." From two lots of Vigilante ore, of 17 and 20 pounds, we have 1¾ and 2 ounces. From the Bowers, eight and a quarter pounds of rock, 1⅜ ounces; Uncle Sam claim, ten pounds of ore, 1⅛ ounces; seven pounds Josephine, one-half ounce; three and one-half pounds Enterprise, one-half ounce; ten pounds Sunlight, one-half ounce, about one-half of which was gold. Should the weather continue favorable, it is expected that the mill of W. T. Jones will be in operation next week, and the above workings are merely tests to see what may be expected. The miners of Mammoth District are all hard at work, taking out good ore, and the prospect seems good for the erection of a number of mills in that district the coming season."

Twin River.—The *Reveille* has been shown by Mr. Willards, who is interested in the Murphy mine at Twin River, an elegant specimen of rich sulphuret ore obtained from the tunnel of that mine. The tunnel has been driven to the extent of 100 feet, and at a depth of about 40 feet from the surface. The tunnel is 6 feet wide, exposing the hanging wall, and cutting through the ledge to that extent. At that depth, the vein is undoubtedly 20 feet thick on the surface. The specimen exhibited to us was taken from a stratum of solid mineral in the vein at least 3 feet thick. In the shaft, sunk near the bed of the creek, which has attained a depth of 40 feet, a body of similar ore 6 feet wide has been developed. The beautiful specimen shown to us will easily assay over $1,200 in silver . . . . The Nye *News* says of Twin River: "The mines of this famous section still hold their own, though we have not had much to say about them lately. The deep snow of the past few weeks, which has somewhat retarded travel, and the temporary blockade placed upon operations in that section have, to some extent deprived us of our usual budget of items, but now that the days are beginning to lengthen, the travel is once more setting in that direction, and we hear of many contemplated improvements shortly to be commenced over there. That the Twin River country is bound to be the best field for mining operations yet discovered in this State, will not admit of a doubt. In what other part of the State has there been found so numerons a collection of large and rich ledges? Were there no other mines there than the famous Murphy, that of itself is enough to establish the reputation of the county. But we have seen ore from many claims which rivals the Murphy. Though this claim is more developed than any other, yet anothor season will witness many mills in operation in this district, and see large quantities of fine ore. We published last week a communication from Twin River, in which mention was made of a number of claims that have been worked nearly all winter, and which are reported to be looking splendid, giving every indication of equalling anything in the district. Since then we have seen some fine rock from two claims, the Otho and Goldstein, situated in Ophir Canon. The Otho is about 6 feet in width, and shows the same character of ore as the Murphy, and as it lies but about 600 yards distant, it has every prospect of being as valuable as this famous mine. In a report made by Professor Clayton, he states that the ore from the Otho assays $321 per ton. That it will improve as sunk upon, is fully warranted by the rapid improvement of all claims heretofore worked to any extent. The Goldstein—which we believe is named after our worthy fellow-citizen, S. Goldstein—is a large ledge, about ten feet wide. Though it does not show rock as rich as the Otho, yet it is a well-defined ledge, and from the samples shown us, we would not object to a few hundred shares in a claim producing such ore, and take the chance of its being rich. Before parties rush off to Montana and New Granada, we would advise them to take a look at the Twin River mines

Lander.—From the Reese River *Reveille*, we take the following: The Stella mine, situated in the Yankee Blade ravine, is located about 300 feet north of the Confidence mine. It is being opened through an incline, which has attained a depth of 40 feet, at which point a heavy volume of water has been tapped. We learn that the Superintendent, J. S. French, who went to Virginia City to purchase hoisting machinery for the mine, has succeeded in procuring perfect and complete hoisting apparatus, which he has shipped to arrive on the ground with dispatch. . . . . We understand that very rich developments have lately been made in the Manhattan Company's mines, on Lander Hill. The mineral displayed in the vein of the North Star, as well as those of the Oregon and Blue ledge, is said to surpass both in quality and quantity, any ores previously extracted. This is one of the oldest properties in the district, and did much originally to give it reputation, and although it has had extraordinary obstacles to combat, we feel justified in predicting that it will prove one of the most stable and remunerative of our mining interests. . . . While recently engaged in doing the necessary grading for the erection of machinery and buildings upon the Washington mine, the workmen uncovered and exposed the vein for some distance. The ore was found to be a handsome chloride, in a vein fifteen inches thick. Under the direction of the Superintendent, Newmark, several tons of the ore were taken out and sent to the Ware mill for reducing. The chloride is undoubtedly very rich, and equal to the best on the famous Lander Hill, and it is estimated by Varney, of the Ware mill, that it will work $300 per ton. . . . . We were shown last evening by John Mitchell, one of the owners of the original Revenue, a curiosity recently obtained from that mine. In taking out the vein a large piece of ore of remarkable richness was thrown out, on breaking which a small bowlder rolled out of its matrix, of the size and shape of a medium walnut. The bowlder is apparently all mineral.

White Mountain.—This is the name of a new mining region that is said to be attracting considerable attention just now. Several persons left Virginia City lately, to try their luck in that new and promising district.

California.

The Nevada *Transcript*, in the course of an article on the croakings of certain persons relative to the "decay" of the State, continues: We want first of all to get clear of these complainers. Then we want more men of industry and enterprise, who are not carried off by every rumor of rich mines at a distance. We want men who are contented to make this State their home, and all such will be richly rewarded in the mines or on the farm. This class of citizens are increasing, and this is the secret of our improvement during the past two years. The sooner the restless wanderers who are carried off by every reputed discovery of rich mines are out of the country the better. Thousands of dollars are now being invested in the mines of this State, and capitalists are ever ready to build mills and work mines where labor uncovers a good ledge.

Calaveras.—The San Andreas *Register* says: Knapp, Wilcox & Co. have a fine stamp mill in operation at Yaqui Camp, about a mile and a half from town, in which they are crushing the dirt from their claim. The pay dirt is a hard cement, which will not wash by the ordinary method, but by running it through this mill it yields largely. The channel on which their claim is located runs into the creek which runs through town, and is believed by experienced miners to be very rich for nearly two miles. But it will require considerable capital to open it, and for this reason it has never been worked. . . . . The miners on Douglass Hill are carrying on their mining operations with vigor, taking out the rich deposits of gold-bearing gravel. The claims in this hill are probably the richest of any in this vicinity. . . . . Several parties in town have been busily engaged during the week in examining several quartz lodes situated near town, with a view to commence work thereon as soon as arrangements can be made. The rock which they have been examining prospects very rich. . . . . A correspondent writes from Murphy's: "Our usually quiet town is all astir with excitement, and the streets are full of men, each showing the other his rock. Within the past few days a great many rich pieces of quartz have been taken from new discoveries in this vicinity. Some Chilenos have found a vein near town, out of which they are making good wages. Woods, on Indian Creek, has been taking out better rock and more of it from the Washington claim, some of which is the richest rock that has yet been exhibited, from a defined lode. About four miles above this place, near the Big Tree road, several parties are prospecting with the most flattering prospects. They have not yet found a well defined lode, but no doubt will in a short time. The quartz is very rich and in large quantities, scattered over many acres of ground. It has long been the opinion of all persons who have made quartz their study and business, that the same lode which is found, and so profitably worked, above Sonora and Columbia, passes through the very section where the rich quartz has lately been found. This same section has had two or three furious excitements of short duration. This time the prospectors are sinking to find the lode with pick and shovel, which is better than possessed all the scientific knowledge by our numerous professors. . . . . Following are the shipments of copper ore from the Union mine at Copperopolis last year: From March 7th to April 30th, 1,786,815 pounds; May, 4,034,370; June, 7,287,820; July, 6,974,485; August, 7,165,355; September, 6,752,885; October, 6,477,420; November, 3,355,370; December, 3,250,245. Total shipments for the year 1865, 47,084,765 pounds, equal to 23,542 tons 765 pounds. The freight on the above from Copperopolis to Stockton, paid at the rate of eight dollars per ton, amounts to $188,339.

El Dorado.—The Dutch Flat *Enquirer* of Feb. 17th says: The Badger Hydraulic Mining Company cleaned up one day last week the handsome sum of $3,000, the result of eighteen days, washing—four men employed. Net dividend to each one-third interest of $75. Warmington, Hoos, Gray Brothers and E. L. Bradley are the lucky parties who own the claim We believe this is the first run the company have made this season. A large tract of the same kind of ground remains to be worked, and the known perseverance and enterprise of the gentlemen owning it is a sufficient guarantee that the Badger will add largely to the shipments of dust from this district in the future. We are also informed that the Iowa Company, a few days ago, cleaned up $2,500, but as to the number of days, washing we are not advised. This is a good claim, and we are assured that the amount given above pays four shareholders a fair dividend.

Tulare.—A correspondent writes: "The mines on

Clear Creek are undoubtedly rich, and beyond cavil. Capital is fast being invested in that region, and I have only to instance, without occupying time with reference to others, that ex-Governor Bigler, of Pennsylvania was so confident of the richness of the mines on Clear Creek, that he recently purchased the quartz mill which belonged to Senator Freeman, of Tulare and Fresno, with some lodes, and he is already fast receiving returns from his judicious investment. Emigration must flow thitherward, and the great county of Tulare will soon show that it can produce something besides fat beef and hogs." . . . . The Los Angeles *News*, referring to mining operations on Clear Creek, says: There are now nine mills in operation, varying each from five to ten stamps. Mr. Bigloe lately purchased the mining interest of Dr. De Laborde, and will commence operations as soon as the machinery for a twenty-stamp mill, now on the ground, can be erected. Mr. Peper has also started a twelve-stamp mill, and judging from the prospects obtained, bids fair to yield a reasonable return to its owner. There are other mills doing as well as could be expected under the present disadvantages of a rather severe winter. The mills at Kelso and Agua Caliente have been in operation some time and are doing very well. There has been within the last week a large sale made, amounting to $75,000. Marshe & Kenady will soon be in operation; their mill is located on the creek a short distance from the town; they intend to run five stamps, and as many arastras as the water power will permit. . . . . A letter in the Visalia *Delta* from Havilah, says: Our mining interests are, just now, in a transition state. They are rapidly passing out of the hands of men who have no capital to develop them, into hands of men who have. This causes a lull of active operations, as men who have capital will not, of course, work on in the small loose way necessary to men without the *dinero*. The mills already here and erected are being worked to some extent, while others are going up as fast as circumstances will permit, and still others are on the way here or being built in San Francisco. It is a noticeable feature that the character of the mills erected here is continually improving. The first were small and very imperfect, but every additional one seems to be a large improvement on the last. We very much need a process for saving the sulphurets, and hope soon to have an effective one. As new processes are introduced we shall save more and more of our gold, one-half of which is now wasted.

Plumas.—A correspondent writes from Taylorsville, Plumas county: Business is beginning to revive here again. Some of the copper companies are resuming work on their ledges. The Mount Ararat Company have a set of hands on their ground, sinking their shaft. They appear to be determined to know what they have got; and well they may be, for they undoubtedly have the best ledge in the State. It is far superior to the Union ledge at Copperopolis, both in richness of ore and ease of working. It is easily reduced in a common blacksmith forge, and freely yields sixty-five per cent. pure copper by working process, and by acid essays, made by Dr. H. T. Lee, it yields from sixty-nine to seventy-five per cent. The new smelting works at Genesee are now in full blast, turning out beautiful bars of pure copper, with only one process. The works are built and run by an experienced man from Europe, and are a complete success, and give new life to the copper interests up here.

Esmeralda.—A correspondent of the Sacramento *Union* writes from Aurora, Feb. 18th: "For the past month we have had pleasant and good working weather. The snow is all gone except on the north side of the hills, and the miners have made good advantage of the time in working the mines with satisfactory results. Yesterday a case was argued in the District Court for an injunction and partition, or segregation of a claim in the Falkirk Ledge, it being a spur of the Crocket, which injunction, it is understood, the Court will not grant. The decision is to be rendered to-morrow. The mining prospects of this county are generally very favorable. The Crescent Company, at Bodie, have struck their ledge, and feel greatly encouraged. The Empire Company, in the same district, are about building another new mill of thirty stamps, as they say they have rock enough for one hundred stamps to work. One of their ledges is opened five hundred feet, and they have the ledge the whole distance, and the richest part is at the further end. Large, heavy freight teams are passing through here almost weekly, loaded with machinery for Silver Peak, Hot Springs, Columbus, and the adjoining camps. We have confidence of very large expenditures in mills, machinery, and working the mines in this county and vicinity during the coming season."

Siskiyou.—Rich quartz diggings are mentioned by the Yreka *Journal*, as having lately been discovered in McConnaughy's Gulch, Scott Valley. They are said to prospect very good, the color being found in the rock for over two miles and a half. . . . . There is a large quarry of superior colored marble on the South Fork of Scott river, which is susceptible of a very high polish, and a better quality for grave-stones, monuments, mantelpieces, etc., than any that comes to this market from below. It is of a dark gray variegated color, and its extent is beyond visible calculation. Solid blocks of any size for building or ornamental purposes can be easily obtained. . . . . The Yreka *Union* says: "The late storm has put a temporary stop to mining operations throughout the county. At Cottonwood the deep claims are filled with water, and they are the same on Hungary creek. At Deadwood, Indian and McAdams creeks, the shafts are filled with water—the drains not being sufficiently large to carry it off. The miners will not be able to accomplish much until permanent weather returns. From Humbug we have the only encouraging news; most of the miners are busy at work and are doing well. We learn that some new mines have been struck a few miles below Oro Fino, which pay large dividends."

Nevada.—W. H. N. Cronise & Co., says the Grass Valley *Union*, of Feb. 16th, yesterday purchased the well-known Cambridge mine for the sum of $20,000 cash. This mine adjoins the celebrated Lucky mine, is a valuable piece of ground, and in the hands of Cronise & Co., cannot fail to very shortly turn out an excellent investment. We hear of pending negotiations for another valuable mine in our immediate vicinity which will probably be closed in a day or two. . . . . The *Transcript* of the 21st says: Yesterday we saw some specimens of quartz from the Sherman ledge, which is located about three miles from Rough and Ready. The rock contains a large amount of free gold and rich sulphurets. The ledge is twenty inches wide, and has been prospected to the depth of twenty feet below the surface. . . . We learn that work has been resumed upon the Mattingly ledge. Some years ago considerable prospecting was done upon this ledge and several crushings were taken out. Part of the rock was worked at Grass Valley and Nevada, but did not pay. The owners are still confident of the richness of their claims, and are determined to prospect it to a greater depth. . . . . One hundred tons of rock from the Mohawk Ledge was crushed at Palmer's mill, Nevada county, and a "clean up" was had on Saturday last. The result is in the neighborhood of $10,000. . . . . At Rocky Bar, a short distance above Washington, a number of companies are engaged in mining out an old channel of the Yuba river. This channel is some distance below the present bed of the stream, and is buried to a considerable depth under ground. It is worked by means of tunnels, drifts, and cuts. The gold taken from these mines is coarse, and is found all through the blue gravel of the bed, but the richest deposits are found in the crevices of quartz. Many lumps are found that weigh as high as $20, and the miners frequently get from $300 to $600 to the pan. The channel through which the river now runs is also rich, and by sinking to the bed rock, gravel which pays from $6 to $20 to the pan can be obtained. . . The old Wigham mine, which has not been worked for more than two years, is again turning out excellent rock. About two months ago the pumps were set in motion by the San Francisco Company. The mine has been freed of water, the drifts and tunnels cleaned, and the company now have seventy tons of excellent rock upon the surface. Stiles' mill commenced crushing this rock on last Monday, and will be kept constantly at work. The company have the mine so arranged that they can take out rock at the rate of twenty tons per day. This ledge is one of the best in the vicinity of Gold Flat. . . . . The G. V. *Union* of Feb. 20th says: We learn this morning that the owners of the Globe Ranch Mine, on Wolf creek, have struck very rich quartz. Samples of it have been seen in town and it will pay a hundred dollars or more to the ton. The company have been working for three years, making wages as they went along, and now they are rewarded a hundred fold. . . . . A lot of one hundred and ten tons of rock from the Tolbert ledge, crushed at the Oriental Mill, was cleaned up on Saturday, and yielded between eleven and twelve hundred ounces of amalgam. We do not know how much the amalgam retorted, but even at four or five dollars an ounce, the yield is large. The ledge is being worked steadily, and we understand the owners propose erecting steam hoisting and pumping works immediately. . . . . A correspondent of the Virginia *Union* writes from Summit City: A short time ago, a very fine ledge was discovered on the southeast side of Old Man Mountain, and known as the Yuba Ledge, Daily Co. It was located by the same individual who discovered the famous Mohawk, which it resembles so closely that only experts can tell the difference between them. It is what miners call an "A" ledge, narrow on the top and widening as it goes down. Its present width is four and a half feet. It is a beautiful vein of quartz, showing free gold, and situated admirably for the running of a tunnel. . . . . Winton's Mill is in full blast, working Pacific rock, but the California has not resumed business since it ceased running a short time ago. The great difficulty of obtaining sufficient quartz, at this season of the year, to keep the mills running with anything like regularity, has caused the temporary suspension of operations. As in every new undertaking, many difficulties have arisen, for which no sufficient provision has been made. The mills were not completed until the winter had set in. The proprietors commenced the crushing of rock, for the purpose of testing the quartz by mill process, under their personal supervision; the result exceeded their most sanguine expectations, and early in the spring the shrill whistle of that motive power, whose muscles never tire, will again be heard in the mountains and valleys, and before the expiration of 1866, not these two only, but I predict, although no prophet, a score of mills will sound "glad tidings of great joy" to many a poor toiling miner, who now believes he has at last met the tide that leads to fortune. . . . In regard to new mills to be constructed, none but those with the most complete contrivances for the reduction of gold, silver and copper ores, should be erected. The presence, in large quantities, of the base metals and semi-metals, quicksilver, galena, antimony and arsenic, and the sulphurets of iron and copper must cause a large loss of the virgin metals. Some mineralogists estimate this loss at the incredible amount of eighty per cent. It is well-known that some of our mines have yielded $71 per ton. If the estimate of eighty per cent. is correct, the value of the tailings from these mines would be sufficient in a few years to cancel the immense debt of this nation, which Secretary McCulloch tells is nearly three thousand millions of dollars. . . . . The *Transcript* says: We recorded, a week or two ago, the finding of a quartz specimen by a man named Spayth, some ten or twelve miles above Nevada, which yielded $640 in gold. The specimen was found in a ravine, just below a mammoth quartz ledge, from which it is supposed to have come. We have since learned some further particulars in regard to the ledge. It crosses Deer creek at the Cascade falls, about twelve miles above Nevada, and which is supposed to extend a hundred miles or more in nearly a north and south direction. It extends from Plumas through Sierra, Nevada, Placer and El Dorado counties, cropping out in places, but is generally barren. At Steep Hollow, it is 30 or 40 feet in width, and for some distance crops out to a height of 15 or 20 feet above the surrounding rock. We have frequently seen notices of this ledge in our exchanges, and we believe it is being worked successfully in some places in Plumas county. Locations were made on the ledge in this county as long ago as 1852, but the prospects not being favorable, the locations were abandoned. A number of locations have recently been made near where Spayth found the specimen, and we understand one company purpose running a tunnel to strike the ledge at a considerable depth. There is reason to believe that the ledge contains rich pockets, which, if found, would amply reward prospectors.

Humboldt.—The *Journal*, February 18, says: "We learn from an authentic source that coal has been discovered within three miles of the town of Arcata. The discovery was made by an old English coal miner, and he says there is abundance of it, and only needs digging out of the ground. The specimens exhibited are of a better and firmer quality of coal than any ever heretofore found on the Pacific coast. Considerable excitement prevails among the Arcatians concerning this newly discovered source of wealth." . . . . The *Times* says of this discovery: Not long since, rumor reported that a vein of coal, four feet in width at the surface, had been opened on land belonging to the Messrs. Preston, situated not more than two miles from Arcata. About a month or so ago, a forty-acre tract adjoining Preston's land was purchased at the Land Office, at the government price of $1.25 an acre, for which we hear the purchaser has been offered four hundred dollars in gold, and it is generally understood that the indications of the existence of coal upon it justify the advanced price offered for it.

Montana.

An old Californian writes from Helena to a San Francisco merchant, some information that is important to those thinking of going to Montana. He takes Helena as a starting point, and gives the distances of the various points in all directions, thus:

SOUTHWARD.—To Virginia (Montana), 130 miles; to Bannock City, 130 miles; to Bear River, (junction of Idaho and Montana routes,) 475 miles; to Salt Lake, 560 miles; to Los Angeles, 1,360 miles.

SOUTHWEST.—To Virginia City (Nevada), 1,110 miles; to Placerville, 1,210 miles; to Sacramento, 1,260 miles; to San Francisco, 1,344.

SOUTHWEST.—(*via* Salt Lake.)—To Denver, 1,250 miles; to St. Louis, 2,150 miles; to New York, 3,150 miles.

NORTHWARD.—To Fort Benton, 130 miles.

EASTWARD.—To Missouri River, 14 miles; to Confederate Gulch, 35 miles; to White's Gulch, 35 miles; to Oregon Gulch, 35 miles; to Avalanche Gulch, 35 miles; to Fort Union, 600 miles; Mussel-Shell, a point on the Missouri river which they are in hopes to reach with boats for six months in the year 212 miles.

EASTWARD.—To Cotton Wood (in Our Lodge Valley), about 60 miles; to Hell-gate, about 143 miles; to French Town, about 156 miles; to Mission, about 292 miles; to Walla Walla, about 500 miles; to Wallula about 520 miles.

NORTHWESTWARD.—To Blackfoot City, 30 miles;

to Washington Gulch, 42 miles; to Jefferson Gulch, 45 miles; to McClellan's Gulch; 53 miles, to Elk Creek Gulch, 60 miles.

To St. Louis, he continues, by way of Fort Benton and the Missouri river, is about 3,450 miles. To Boise City, by the route taken by some trains, which came in this fall, the distance is about the same as to Walla Walla. The distances given show conclusively the only practicable route for the trade and travel of California, Oregon, and Washington, is *via* Columbia river. The sooner all matters connected with routes are settled the better. The point on the Columbia river from which stages are to start should be determined upon, and arrangements made for putting on a line of stages, with convenient stations along the line. The completion of the steamboat on Pen d'Oreille Lake should be pushed forward as fast as possible. In short, all should be done that can be to show the public that they can go to the Blackfoot country *via* Columbia River and Pen d'Oreille Lake quicker and cheaper than by any other route. From the first Falls on Clark's Fork this side of Pen d'Oreille Lake, to Helena, I could make arrangements to-day to have a line of coaches put on as far as the Agency or Horse Plains, and a saddle train from there to the Falls It is one of the best natural routes in the world. Horses could work on grass all the season without any difficulty. It has been done between here and Virginia City, and between here and Blackfoot City. There are houses along the whole route, or will be by the early spring. I have induced one or two parties to take up farms along the route, who wished to do so, if a line was to be established. Of the success of the route *via* Pen d'Oreille Lake I have no doubt, and all I have heard since writing you in regard to the matter goes to substantiate what I then wrote. A pack train of ninety animals came in to-day, which loaded up in the fall for me, and they speak most favorably of the practicability of the route *via* the Pen d'Oreille Lake. They make the distance from the head of navigation on Clark's Fork (say the Cabinet) to the wagon road, sixty miles at furthest. . . . . I will tell you all I know of the resources of this country The gold crop of Montana thus far has been from placer diggings. Quartz mining is in its infancy. Up to the present season the mining has been confined to some three gulches—one in the vicinity of Bannock (Grass Hopper), with Alder & Bivens, in the immediate vicinity of Virginia City. Within the last twelve months gulches without number have been discovered. Among them (*all* paying) are French, German, Last Chance, Grizzley, Oro Fine, Dry, Nelson's Deadwood, Ophir, Carpenter's, Washington, Jefferson, McClellan's Confederate, Oregon, White's and Avalanche, gulches. Of the amount of gold taken from these camps it is impossible to form anything like a correct estimate. They cover an area of some one hundred and fifty miles long and some sixty wide. Some of the best camps recently discovered are within four hundred miles of Walla-Walla. Close on the heels of placer discoveries have come those of quartz, until there are lodes at all points of the compass. . . . . The first mill in this immediate vicinity was put in operation last week, some six miles from here. The result of the week's work was $1,400. The mill has ten (10) stamps. A number of mills have arrived this fall, and will be put up this winter. Enough is known to satisfy me that this is one of the most extensive mining districts yet discovered, and will hold its own with any country in point of richness. I am satisfied that few people in California or Oregon fully appreciate the value of this section. I am of the opinion (and not alone) that the country east of the Bitter Root Mountains is of as much value to Oregon, as the belt between the Cascade and Bitter Root Mountains. You may think "I put it rather strong," but time will tell the story. I have tried to look on all sides, and can come to no other conclusion. . . . . The bulk of goods purchased have arrived, but many have to lay over on the Missouri River at points where the boats were obliged to discharge their cargoes. Of all the boats that started up the Missouri River last season, only seven succeeded in reaching Fort Benton. Most of the purchases for this market were made in St. Louis during the months of March and April last, at which time goods were high and gold low, and the figures look large. Coffee, 35 cents; crushed sugar, 28 cents; a blanket similar to the Salem, $18 per pair, and other goods in proportion. . . . . The Salt Lake *Telegraph* of February 9th, has late news from Montano. "The Montanans," it says, "are evidently on the eve of another big Indian fuss. We have before stated that around Fort Benton the savages were reputedly on the steal and shoot path, if they were not on the plain war path. H. D. Upham, the Deputy and Acting Indian Agent for the Blackfeet, had represented to Governor Meagher that the Piegans and Bloods had been committing serious depredations on property, and perpetrating many murders, both in respect to whites and other tribes of Indians. Major Upham mentions the supposed murder of a company kbown as Huniche and Legree's, by the Piegans. These hostile Piegans were camped on the Marias river, 90 miles from Benton, and were estimated at 300 young warriors under Little Dog's son, who, Agent Upham says, 'have got to be killed before a man's life is worth a cent there.' The Crows and Gros Ventres say they are willing to assist the whites in cleaning out the Piegans. The citizens at Benton had organized for self-defence, and petitioned Governor Meagher to send 500 men to punish the red skins and protect the whites. Accordingly the Governor is out with a proclamation, calling for at least 500 mounted volunteers to march against the marauders and murderers, and demand and put to death the guilty parties. As there is no appropriation to meet the expenses of the expedition, and no Legislature sitting to vote supplies, the merchants of Virginia and Helena are invited to advance such stores as may be necessary, to be receipted for by the Quarter-master and Commissary of Subsistence. The volunteers are requested to equip themselves with horses, arms, ammunition, blankets, &c., and report at headquarters at Helena. The Governor furnishes 30 Springfield muskets, 3,000 rounds of ball cartridge, bayonets cartridge boxes, and some other accoutrements. So we may be expecting some lively news when the expedition gets fully under way and fairly at work." . . . . "The following," says the *Alta*, "is the list of charges and distances from this city to Montana and Idaho, *via* Salt Lake, prepared with care by a gentleman well posted on the matter:

From San Francisco to Salt Lake City *via* Sacramento river, Placerville, Virginia City, and Austin by the Pioneer Stage Line; fare, $125.

Salt Lake City to Virginia City, Montana, Holladay's Line, tri-weekly; distance, 450 miles; fare, $125 (legal tenders).

Virginia City, Montana, to Helena (Last Chance); Oliver Company Line, daily; distance, 110 miles; $15 to $20 (dust).

Helena to Blackfoot City; Oliver Company Line, daily; distance, 45 miles; fare, $10 (dust).

Virginia City, Montana, to Fort Benton, on the Missouri river; distance, 260 miles; no public conveyance beyond Blackfoot.

Salt Lake City to Boise City; Holladay's Line, tri-weekly; distance, 450 miles; fare, $125 (legal tenders).

Helena to Diamond City, Montana; distance, 35 miles; fare, $7 50 (dust)"

. . . . According to the Nevada *Transcript* of Feb. 16th, "a gentleman who recently arrived from Montana, does not give so highly-colored an account of the country as we are in the habit of hearing upon the streets daily. He says that the mines are not so good as those of Nevada county. They can be worked but few months in the year, on account of the severity of the climate, and many poor fellows have there limbs frozen in the winter. Every necessary of life commands famine prices."

From Nevada City, Montana, a correspondent of the Sacramento *Union* wites:—"This gulch (Alder) the first discovered in the Territory, except one—is some sixteen miles in length, and has been very rich, but is nearly worked out. Many have made fortunes here, but it has cost at least seventy-five cents for every dollar obtained, owing to the depth of stripping being from eight to fifteen feet, and much of the diggings on the low bars and toward the head of the gulch are still deeper, being from twenty to fifty feet, and have to be drifted and timbered, which is quite expensive. Taking all things into consideration, such a gulch in California, at any time prior to 1856, would have created no unusual excitement; and I will hazard the assertion that nine out of every ten gulches of corresponding length, in California, have paid more per diem for all the labor expended than this has ever done, or ever will do. There have been many new gulches discovered in the past year, among which may be mentioned the Last Chance, Blackfoot, Confederate, McClellan, and Montana, as the richest. There are a score or more of less note and but little developed, and every week brings news of new discoveries." . . . There are two great drawbacks to successful mining in this Territory. First is the long, cold winters, in which all mining operations are suspended, except prospecting; and, in the second place, the enormous prices of living. Merchants here are like the negro, who said, if he bought anything for one dollar and sold it for two, he was sure he made one per cent., and was satisfied. But the negro's one per cent. does not satisfy the Shylocks of Montana, but two and three hundred per cent. is often charged for any article that happens to be scarce in the market. A few items I will note, that are on the rampage just now: Tobacco comes first (I am out), and sells at from $3 to $8 per pound; tea, from $3 50 to $5; coffee, $1 25; salt, 75 cents; matches, 50 cents per box; axe and pick handles, $3 each; California whisky and brandy, from $8 to $15 per gallon. . . . The agricultural resources of Montana will, when fully developed and put in successful cultivation, be quite adequate to supply the wants of the population. . . . Quartz on the drain are quite prevalent at this time, and the gold and siver lodes are said by the knowing ones to rival, if not excel, those of California, and some predict as rich results from some of the silver lodes as anything yet obtained in Nevada. Some few mines are in operation and paying well. Many more will be built next summer. I would say to those contemplating coming here, to "look before you leap." If you have a comfortable home and are making a living, stay where you are; for any of the comforts of life such as you have in California cannot be had for any price in this no-God country. However, we would welcome any Californian, who possesses bowels of compassion, that might drop in among us with a few teams loaded with tobacco, salt, tea, coffee, sugar, whisky and pick-handles.

Colorado.

A correspondent of the *Tribune*, who has recently travelled through the Territory says: "Colorado is a good illustration of the early uncertainties of mining. Its gold-bearing quartz opened very richly, and during the first wild excitement fully $20,000,000 of Eastern capital were invested. One company sold $600,000 worth of stock at par, for cash, over the counter of its New York office in a single day, and at the close of business hours was compelled to call in the police to clear the room of eager and impatient purchasers. As the quack advertisements say, "children cried for it" Thus quartz mills with an aggregate of 2,000 stamps were sent to Colorado, and mines opened. But at a certain depth the character of the veins changed. The gold was there, but associated with pyrites of iron, and could not be separated by any known process. From that day Colorado mining has been practically suspended. Of course, American ingenuity will prove equal to the emergency. After infinite experimenting, several processes for saving the gold are nearly demonstrated successes, and mining stocks which had "touched bottom" are once more appreciating in value. In Peru, silver mines are worked at the depth of 1,700 feet, and one California gold mine is opened 1,000 feet with no exhaustion of the ore. . . . . From the Denver and Black Hawk papers we learn the following: D. D. Belden reported, on January 31st, his operations for the same month, in the Smith & Parmelee mine, 427 ounces of gold—valuation $7046; treasury note value, $9722—on which he says there was a handsome profit, although it was by far the poorest month's operation since he had charge of the business—now six months. The mine is now improving, and he thinks the present month will show better results. . . . When the consolidated Gregory was organized upon 500 feet of the Gregory lode, now nearly two years ago, it seemed disposed to adopt the suggestions of Mr. James E. Lyon as to its future operations. It was Mr. Lyon's idea, even before the sale and consolidation were effected, that a different system of mining must obtain here or the business be abandoned. Three or four years' experience in mining had convinced him that such was the case. At that time, the idea of any essential improvements in milling was not generally entertained, and indeed most of the Colorado mill-men believed that nothing would ever supersede the stamp-mill in the manufacture of the ores. Hence the huge stamp-mills which were purchased by several if not all of the newly formed companies, under the impression that in working on a far larger scale, labor might be economized and profits correspondingly increased. The consolidated Gregory bought a 100 stamp-mill, which came West as far as the Missouri River. Meanwhile Mr. Lyon had been experimenting with smelting, and becoming convinced that it was the treatment and the only one then known for the Colorado ores, while he proposed to test that treatment on a large scale in Colorado on his own responsibility, the company appeared to think it best to let its mill lie still and await developments. We trust that by the time the mine is properly opened, Mr. Lyon's smelting-works will be in full and successful blast, and that they will have proven even a greater step forward in the business of treating the sulphurets and pyrites than the institution of system and economy in mining is in the business of producing or raising the ores to the surface. . . . . The new Briggs mill has started a portion of its fifty stamps. The mill is built of wood and brick combined, its foundations and those of the batteries are solid, and it is 50 by 87 feet in dimensions, with a lean-to on the back side, the whole length, and 30 feet wide. In one end of the main building are the boilers and engine, in the other a double set of batteries, twenty-five 800 pound stamps in each, facing together, and perhaps 12 feet apart. The tables are stationary, five feet in length, plated with copper sheets one-fourth of an inch thick, have 4 or 5 wooden riffles at their lower ends, and discharge into a trough, also copper plated and so inclined as to carry off all the stuff coming from the batteries. There is one shaft in front of the boilers, handy to one set of batteries; another just outside the mill in rear of the boilers, handy to the other set of batteries. This mill will have cost, complete, about $150,000, and that in full operation, the company's pay-roll will require $2,000 a week. The management confidently calculates, however, from what has been done before, upon taking out a full thousand dollars a day. At this rate, the mill will have been paid for six or seven months hence. Which is all very favorable indeed. . . . . A few weeks since, we went to see the Colfax lode; the shaft was then about 70 feet deep, and very fine argentiferous galena was coming in fast. We hear that the owners have been steadily sinking since, with more and more encouragement; also that

Mr. Henry has formed a company with a nominal capital of $200,000, one-fourth paid in, among the members of the Massachusetts Legislature, to develop the lode. The consideration to the owners was $100,000 worth, or one-half the capital stock.

Arizona.

Alluding to the San Francisco District, the Mojave City correspondent of the *Alta* writes:—Enterprising, hard working miners have at length shaken off the fetters rivetted on by the few early pioneers three years ago, and are pushing forward tunnels and shafts to develope unprospected lodes. Some of the old hangers-on, or drones, are boasting that these enterprising men are but working for them—that they are jumpers, and that the courts of California and Nevada always decide against jumpers—that, as soon as rich ores are developed, they will resume full possession; but we guess "not much." But as to what has and is being done: Mr. Hardy has been working for the past six months from fifteen to twenty-five men on the "Parsons" and "Michigan" lodes. A tunnel is being run upon the "Parsons" that will strike the vein at a depth of 500 feet below its croppings; it is now in 325 feet. A shaft is also being sunk that will strike the vein at a level one hundred feet lower than the tunnel. The "Michigan" lode runs across and at right angles with the "Parsons," upon which a tunnel is now in three hundred feet; it is designed connecting it with the Parsons tunnel, thus giving both mines complete ventilation. Both tunnels have already proved a considerable water in the hill in which they are run. Mr. Hardy's claims on the Parson's lodes, are known as the Southern Cross Gold and Silver Mining Company's claims, west, a half-mile, upon the same lode as the Queen of the Pacific Company's claims, upon which a tunnel is being driven—now in one hundred feet. West of and adjoining these claims are the Invincible Gold and Silver Mining Company's claims, upon which a shaft is being sunk. A tunnel, is being run upon the Leland lode, will prospect the vein six hundred and sixty feet below its croppings. Every one interested in the prosperity of the San Francisco District will rejoice to hear that the noted Moss lode has at length got into hands that will turn some of its immense wealth to account. The mine has been purchased by a heavy New York company, and no less a personage than Mr. Charles L. Strong, under whose excellent management the Gould and Curry gained its world-wide celebrity, is here, taking the initiatory steps towards opening and working the mine. He has about sixteen men at work grading roads to the mine, and preparing foundations for buildings. It is confidently expected that within a year ours will be as lively a mining camp as any on the continent . . . . There are many seemingly reliable reports continually coming to hand about rich placers away in the White Mountains, which are situated in the heart of the Apache country. It is the old story of gold bullets revived. So far as I have heard, all parties who profess to know anything about it, concur in the richness and locality of the mines. It is not known how extensive they may be, but there can be but little doubt that somewhere northeast of Prescott, in the neighborhood of 150 miles, there exists rich placer gold mines. If such is really the fact, the best force that can be brought against the Apaches is an army of miners, who would not be slow to occupy the country once it was clearly demonstrated. . . . . A telegram from San Francisco, March 25th, states that Arizona papers up to the 16th report mining operations as being very prosperous. . . . . The *Alta* says: "We have received from Mr. Thomas King specimens of rock salt from a mountain of the article located near the mouth of the Rio Virgin, Arizona, about thirty-four miles from Callville, on the Colorado River. This salt is as clear as the purest rock crystal, and if it were not for its being so readily soluble, might be cut and ground into spectacle glasses like Brazilian pebbles. The supply of the article is said to be perfectly inexhaustible. Salt was recently shipped from this city, for the use of the smelting works about to be erected at Williams' Fork, on the Colorado, at an expense for freight of $70 per ton. Should the copper, silver and gold mines of Arizona, turn out as extensive and rich as they now appear, the discovery of such quantities of salt, near the banks of the Colorado, will prove an important item in their development.

Pennsylvania.

The Onondaga Salt Company, of Syracuse, N. Y., have sold their interest in coal mines in Pennsylvania to the Morris Run Coal Company, for $739,800 57. Of this sum $510,000 was bonus. The Salt Company, at the same time, secure a contract for all the coal they want for manufacturing purposes, for the term of seventeen years, at fifty cents a ton above actual cost. . . . . From the annual report of the Board of Directors of the Pennsylvania Railroad Company, we learn that during the last year, 1,074,757 tons of coal were carried as frieght—a decrease of 12,622 tons from the previous year. . . . . One of the party of British capitalists that made the tour of this country last summer, writes in the London *Railway News*: The coal of the Mahoning Valley and the surrounding region is, as far as known, of a different character to that of any other portion of the Alleghany coalfields, or, in fact, of any other bituminous coal, in its freedom from sulphur, and its applicability, in the raw state, to the manufacture of iron. In other places the coal has to be coked before it can be used in the blast-furnace. The coal of the Mahoning Valley region requires no such preparation, but is used directly from the pit in the manufacture of the best quality of pig-iron. This bed extends eastward into Pennsylvania, keeping a few miles south of the main line of the Atlantic and Great Western Railway, and terminating a few miles west of the Franklin branch. In fact, it occupies nearly the whole space bounded by the main line and the Franklin and Mahoning branches, being easily accessible by lines pushed out by either of these, but only actually penetrated by the Mahoning branch, which taps it at one of its best points. The whole area of this bed of coal is about one thousand miles. The dip in the Mahoning Valley is S. 12 deg. E. 20 feet in a mile. The only developed portion of this valuable field is that in the vicinity of Youngstown, in Ohio, and at Sharon and New-Castle, just across the Pennsylvania border. Recently, valuable seams have been found in the eastern portion of the deposit, at Sandy Lake, which is a few miles west of Franklin, and easily accessible by a branch from that place, or from the main line of the Atlantic and Great Western, should it be desirable to construct one. This bed of coal from the Mahoning Valley to Sandy Lake, is destined to be the home of iron manufacture. From Cleveland, the rich iron ores of Lake Superior are brought down by railroad and canal to the side of the pits, where there are inexhaustible supplies of stone-coal ready for immediate use in the furnace. The hills are full of iron ores and limestone for fluxes, and as soon as the iron is manufactured, the railroads and canals are ready to take it to market, or to the manufactories, where the pig-iron is worked up into useful shape. As yet the business is in its infancy, but the progress of iron manufactures in the Mahoning Valley has been rapid and great. In 1846 there was but one blast-furnace in the Mahoning Valley, now there are in the valley proper, fourteen in successful operation, and about a dozen more in the neighboring county. In 1858 the total amount of iron ore taken into the Mahoning Valley was 3,000 tons, obtained entirely from Northern New York. In 1864 the importation to the same region, by the Mahoning branch alone, was 90,775 tons, in addition to which a considerable amount was taken by canal, nearly the whole being the rich ores of Lake Superior. Additions to the iron-making establishments of the valley are continually in progress. In 1849 the coal raised in the Mahoning Valley and shipped to Cleveland, amounted to 26,851 tons. In 1854, the Mahoning Railroad, then only partly opened, and the canal, transported to Cleveland 100,000 tons of coal. In 1864, the engineer of the then unfinished road reported to the directors an estimate of the probable business of the line when completed to Youngstown, its present terminus. He expressed his belief that there would come upon it a transportion business of 200 tons of coal daily—the present business is over 500 tons per diem. In addition, he stated that he expected a return freight of 100 tons of miscellaneous merchandise, including iron. The return from Cleveland, of iron ore alone, is 300 tons a day. The amount of business is now limited only by the capacity of the road. With increased facilities, soon to be provided, the transportation of minerals over the road will be enormously increased.

Idaho.

A correspondent of the Placerville *Mirror* writes from Silver City: The Owyhee silver mines, so seldom mentioned by the press of California and always depreciated by the press of Nevada, are now acknowledged by all visiting this section to be the richest ever known. We have many ledges that cannot be excelled in richness, in both gold and silver. Also, cinnabar, tin and diamonds abound. As for the latter, I cannot vouch, but the other valuables certainly do exist in this locality. Not being a very brilliant community, we are as yet undecided on the diamond question. Something resembling diamonds has been found in abundance, and many have been sent for the inspection of experienced ones below. If they prove valuable, the diamond will depreciate, for we can stock the diamond market of the whole world. Of all the silver ledges ever seen by man, the Poorman, no doubt, is the richest. It is useless to attempt to describe its value, as I think its richness is beyond the power of calculation. Four weeks working in this mine yielded the handsome sum of half a million dollars, when litigation began, stopping the stupendous daily yield of this mammoth deposit of silver and gold. This ledge is our boast, and we challenge the mining world to compete with it. Layer after layer of great sheets of silver are found in it, resembling more a massive jelly cake; as jelly is to the bread, so silver is to this rock. Silver predominating over quartz, makes this essentially a silver ledge. Many stories have been published in connection with this ledge, but nothing yet has exaggerated its value. Should it keep up its lick for a year, we venture to say that we can build our side of the Pacific Railroad. The Chico and Humboldt routes are the natural highways by which Owyhee must have communication with California, being half the distance and one half less expensive than the roundabout road *via* Portland. California should be up and doing in this matter. She naturally is our market, and on her we will depend for our future wants. Webfoot has failed to furnish us with the necessaries of life so far, causing famine to stare us in the face for two winters, and we expect nothing better until we have communication with you overland. We have the "bricks" to exchange with you for your produce.

. . . . "A. D. R." writes to the *Tribune*: Practical men believe that the Flint District ores can be taken out and reduced for $20 per ton. If so, it is even richer than Owyhee. It has some good water power—a most important consideration, for a 20-stamp steam-mill consumes daily 10 or 12 cords of wood, costing $6 to $10 per cord. With water-power, a small steam engine (five or six horse-power for a 20-stamp mill) is required for amalgamating. Fifteen-stamp mills are more economical than 10, and 30 than 20, only the same number of men being required to run them. Once more I urge capitalists designing to purchase, to look at the quartz regions in person, or send out a trust-worthy agent. One week in the mines will give more exact and valuable information, than a year's study in a New York office or library. The lateness of the season prevented me from visiting Idaho City, with its 3,000 people, the largest town in the Territory, and metropolis of all the placer and several of the quartz regions.

Oregon.

"The mineral resources of Oregon," writes a Portland correspondent, "are very great. The gold and silver quartz lodes already yield richly. Iron is found in abundance within fifteen miles of this city. Some of it has assayed 60 per cent pure metal. Wood is plentiful, and the ore ought to be reduced here. The Pacific Coast uses 70 tons of iron daily, but imports it all from the Atlantic coast, except the supply for Vancouver Island, which comes from Scotland. I hear much, also, of the Sontiam gold mines, a few miles from Salem, capital of the State. They seem to equal even the rich deposits of Idaho. . . . The Dalles *Mountaineer* gives the following table of the estimated annual product of gold and silver on the Columbia and its tributaries:

John Day Mines	$1,500,000
Warren's	750,000
Elk City	25,000
Florence	200,000
Clearwater	200,000
Oro Fino	600,000
Bars of Sal, Snake & Clearwater	400,000
Clark's Creek and M Basin	150,000
Colville, Pen d'Oreille and Kootenai	1,000,000
Montana Trade	1,000,000
Auburn	500,000
Total	$6,450,000

Indiana.

An excitement about coal has arisen in Spencer county, Indiana. Back of Grand View the hills are reported full of coal, superior in quality to any west of Pittsburg. The Lafayette *Journal* says: A company has been formed in Cincinnati, with a capital of $300,000, which proposes to develop these mines to their fullest extent, as soon as the machinery can be purchased and put in operation. The vien of coal the company proposes working is about five feet thick, and the coal of an excellent quality. The company also contemplates the immediate construction of a railroad from Grand View to the mines, for the purpose of delivering coal, in any quantity that may be desired, on the river bank.

Massachusetts.

A vein of gold-bearing quartz has been discovered in Western Massachusetts, which promises to be remunerative under judicious working. Recent operations, on what is known as Diamond Hill Lode, disclosed in one sample the presence of gold at the rate of 2 ounces, 4 pennyweights, 6½ grains, to the tun of gross material; or $49.64 per tun; in another sample, $41.14 per tun, and in the third sample (the material being decomposed surface ore,) $35.12 per tun.

Minnesota.

The Vermillion Falls Gold Company, with a capital of $300,000, has been organized at St. Paul, to "mine, crush and smelt gold and other precious metals in St. Louis County." They have eighty acres of land located upon a point extending eastwardly from the southern shore of Lake Vermillion, in St. Louis County, Minnesota.

Kansas.

The State Geologist of Kansas places in a very strong light the mineral importance of that State. He asserts that salt-springs exist in nearly every county. Salt, in a pure, solidified form, in a stratum two feet in thickness, is found in Republic County.

The coal-measures are extensive, the Osage and Cherokee veins being especially rich. Beds of gypsum have been discovered. Iron ore and tin are also found.

British Columbia.

The Victoria papers are full of the wonders of the Big Bend mines, and they appeal to the miners of California to come and get rich. . . . A correspondent writes from the new diggings thus: Cariboo, which has heretofore been the great centre of attraction as a gold field in British Columbia, has been entirely eclipsed by the discovery of rich surface diggings contiguous to the Columbia river in the southeast portion of the Colony, about one degree north of the forty-ninth parallel of latitude. Although William's Creek has been, for its extent, the richest gold field in the world, it has never been popular with the miners, simply because the diggings were deep, the prospecting expensive, and the lead uncertain and difficult to find. There was no such thing known in Cariboo as the "Poor Man's Diggings," although many a poor man has been made rich by a fortunate turn of luck in that region. The gold, however, was taken out by the *few*, while the *many* were obliged to either work for wages or go away disappointed. For two or three years past great exertions have been made to discover surface diggings in the country, but, until late last fall, without effect. The Government fitted out a large party of prospectors in the spring of 1865, but after a season's labor in the mountains, they returned without being successful. What the Government failed to accomplish, the individual efforts of old California pioneers succeeded in bringing to light. Surface diggings on six creeks were found, that, so far as they have been tested, have not been surpassed in richness by any mines on the Pacific coast. The new diggings are within a week's journey of the Victoria, and not more than half the distance to Cariboo; besides, there is water carriage nearly all the way. Prospecting last fall was done under great disadvantages. The men had nothing but "flour straight" to live on, and even mining tools were not to be had for "love or money." The wonder is, how so much work was carried on; and it proves the great richness of the mines, that with every obstacle with which the pioneers of a rough and rugged country have to contend, the amount taken out in a few weeks' time reached over one hundred thousand dollars. The gold is coarse, and assays well—nearly nineteen dollars per ounce. I have seen a large bar of French Creek gold, purchased by the Bank of British Columbia, and assayed in the Government Assay Office in New Westminster. It was beautiful gold, far superior to any ever produced in the Cariboo district. The Government of British Columbia have had several of their surveying officers over the new mining regions. They all confirm the glowing accounts given by the miners. Messrs. Turnbull, Moberly, and Dowdney's reports to the Governor have been published in the *Government Gazette*, and speak for themselves. The new creeks head in the Selkirk range of mountains, and as they are all very extensive, there is room for a vast population to work upon them. The district has been given the name of the "Big Bend," from the creeks upon which the gold has been found being close to the place where the Columbia makes a very abrupt turn or bend. The greatest amount of mining has been done on French Creek, which falls into Gold River; the latter empties into the Columbia, above the Dalle de Mort. A large number of claims have located on the Creek, and many "old hands" have done well, but the majority have only prospected their claim. Shep Bailey Company took out $100 a day to the hand. St. Germain Company made from $20 to $30 a day to the hand. "Old Texas" took up ground that prospected over $3 to the pan. He sold a small interest for $800. La Fleur Company, three men, made $18,000 in ten weeks out of a bench, and they only worked 75 feet of ground. The deepest part of the bench is only fifteen feet, but the average is only six feet. Dupuis, a French half-breed, had a claim adjoining La Fleur, and he took out $3,000 to his own hand. In one day he made as much as $800. The following well-known old miners on this Coast have claims on this Creek; Jim Burbes, Bill Anderson, "Judge" Perrier, Gill, Chatman, Martin, Redman, Twentyman, Sam Neal, Jack Jones, Coser, Casone, Jim Thompson, and Clarkson, the packer. The latter, by the way, paid $800 for a piece of ground belonging to La Fleur, and in a week he got back his money. The gold is found in the gravel, and there is almost an entire absence of clay. The bed rock is blue slate, similar to that on Williams Creek. In addition to French Creek, there is McCulloch's Camp, Carne's and Gold Creeks. These have all been prospected with the greatest success. On McCulloch's Creek as high as 35 ounces per day have been taken out by one company from the gravel only a few feet from the surface. The Walla Walla *Statesman* says the new mines are "quite as rich and in every way as extensive as those of Montana." I may state that they have this advantage—they are not one-fourth the distance, and can be reached from San Francisco in eight or nine days, at a cost of little over $50, whilst the Montana will take from six weeks to two months, at a cost of at least $250. It should also be borne in mind that if the miner is not satisfied with the Big Bend he can easily proceed on to Montana or Cariboo, as he is not taken out of his way to either of those places by the Big Bend. I shall now proceed to mention the various routes from San Francisco to the Big Bend mines:

ROUTE VIA. PORTLAND.

	Time.	Fare.
From San Francisco to Portland...	3½ days	$25
From Portland to Walla Walla by steamer, 210 miles	4 "	18
From Walla Walla to Colville, 240 miles by land.....	9 "	walk
From Colville, by steamer to Little Dalles, 250 miles	4 "	$20
From Little Dalles to the mines by land, 60 miles.....	2 "	walk
Total.....	22½ "	$63

If to the above is added the expenses of a man travelling from Portand to the mines—19 days, at $3 per day—it will bring the total cost up to $120.

ROUTE VIA. VICTORIA, V. I.

	Time.	Fare.
From San Francisco to Victoria by steamer *Labouchere*.....	3½ days	$15
From Victoria to Yale by steamer, 175 miles.....	1½ "	4
From Yale to Savanah's Ferry, 133 miles by land	5 "	walk
From Savanah's Ferry across the Lakes by steamer, 110 miles...	1 "	$10
From head of Lakes to Gold Creek, 55 miles by land.....	2 "	walk
Total	13	$29
Expenses for nine days, at $3 per day.....		27
		$56

The total distance from Portland to the mines is 760 miles—time, nineteen days, at a cost of $120 From Victoria the distance is 473 miles—time, nine and a half days, at a cost of $56.". . . . Another correspondent, after estimating from an official map the distance from New Westminster to Gold Creek at 393 miles, and placing the total expense from San Francisco to the Creek at $84, says: "Of course, if men walk from Yale to Savannah's Ferry, which they can easily do in five days, the cost of the journey will be $40 less than the above estimate. There are good roadside houses all the way, and meals are never more than $1 25. I look for brisk steamboat opposition from San Francisco to Victoria, as well as on the inland waters of British Columbia, in the spring, when of course fares will be considerably reduced from the figures set down above. As an evidence of the faith which the government of the country have in the mines, they are laying out between $20,000 and $30,000 in constructing a wagon road to Lake Kamloops, from the Grand Trunk road to Cariboo. The Big Bend mines are not more than half way from New Westminster to Cariboo. A new steamboat is in progress by the Hudson Bay Company, at a cost of over $50,000, for running on Lakes Kamloops and Suswap, exclusively to meet the trafic to the Big Bend mines." . . . . Another correspondent, writing from Portland, Feb. 13th, to the Sacramento *Union* says: "The term "Big Bend" of the Columbia arises from the abrupt turn which the McGillivray branch makes at the point where it is joined by the Canoe River (heading with the Fraser) and the stream issuing from Mount Hooker Pass in the Rocky Mountains· The stream s here unite to form the Main Columbia. Within this bend, between the fiftieth and fifty-second parallels of latitude, the new miners are situate. It is believed that for an extent of more than two hundred miles that country is highly auriferous, the diggings being chiefly shallow of surface, easily worked, and exceedingly rich. A number of large creeks have been discovered; the principal ones, however, that are known to possess valuable deposits of the precious metals, are Carnes, McCulloch's, and Camp Creeks. They all head in the western slope of the Selkirk range, the Columbia River being the grand receptacle for their waters. Carnes Creek is from sixty to one hundred feet wide, rapid, and empties into the Columbia about sixteen miles below the Rapids de Mort. Within half a mile of the mouth of the creek, the Hank Carnes and Clarkson companies took out, last fall, $40 per day to the hand in the top gravel. The creek was prospected for many miles up from its mouth, and coarse gold obtained in paying quantities. Several claims were located in the fall, and many men remained over winter to commence operations in the spring. Gold Creek is a large creek, like Carnes, emptying into the Columbia from the east. Very little prospecting has been done upon it, but what has, is most encouraging. From fifty cents to $1 50 to the pan has been taken out. A number of claims have been pre-empted on the main creek as well as its tributaries. More work having been done on French Creek than any other, it is the most important in the district. It empties into Gold Creek. The banks, varying in depth from six to fifteen feet, are gravelly, and the diggings destitute of clay. The creek was discovered in the latter part of last summer, by three French half-breeds, (La Fleur Company), who had it to themselves for some time. They worked seventy-five feet of a bench, the average depth being six feet, and in two months made from $15,000 to $18,000. A packer named Clarkson, who had followed the prospectors, bought a portion of the claim after it had been prospected, and in one week he got back his $800 (the purchase money), and the claim paid as high as sixty-nine ounces in a day, afterward. Owing to the scarcity of provisions, the prevalence of scurvy, and only "flour straight" to live on, he was obliged to quit work with $3,000 for his short season. A French half-breed, named Dupuy, took up a claim next La Fleur's, late in the season. It yielded wonderfully. Having rigged a few sluice boxes and worked in the face of the bank, the dirt paid from the beginning. He took out as high as 100 dollars to the pan, and before he quit work made over $5,000. He crossed the line with his money, but at Fort Sheppard had to pay export tax on his gold. Judge Perrier, an old Californian and Frazer-riverite, worked for a few weeks on his claim, and was reimbursed, as well as his partners, for the long trip they had from Wild Horse creek, from which they returned in time to make expenses before the close of the season. Jim Thompson and Bill Anderson were offered $2,000 for their claim, but they declined it, although they had very little time to work before the winter set in. A claim above them sold for $1,000. The Weller or Shep Bailey claim yielded twenty ounces per day. Myers bought one-fourth interest in it for $1,000. Many other companies did very well, but owing to there being no provisions or proper mining tools in camp, the men were put to great inconvenience as well as severe privations. The creek is of great extent, very promising, and in the ensuing season it is expected will create quite a furore of excitement. A good many claims were located, but the majority were only partially perfected. Late in the season McCulloch discovered the diggings on McCulloch's creek. It empties also into Gold river. It is a small, swift stream, like Lowhee creek, in Caraboo. The gold is coarser than on any other creek in the district. The prospects were as high as from three to four dollars to the pan. The Clemens Company took out from twenty-five to thirty-five ounces a day, as long as they were able to work. Barney Riley (an old Californian) describes the claim as 'shelling out gold like beans.' One piece taken out of the Clemens claim is worth twenty-five dollars. Several claims were taken up and recorded on this creek. Camp creek was one of the latest discovered creeks in the country, but, from the prospects obtained, is not inferior to any of the others. I have conversed with several of the miners who have been through the Big Bend country last fall. They are mostly old California and Frazer river men, whose interests, one would think, would be to keep others out of the country, so that the good things might fall to themselves. They are not so selfish, however, as in no instance did anyone attempt to conceal his honest opinion of the valuable discoveries that have been made and the openings, or rather the alluring prospects, that the new mines offer to the mining community. There is room on the creeks already prospected for thousands, and, from the proximity of the mines to the frontier, provisions will be moderate in price and abundant. It being late in the fall when the most valuable discoveries were made, there was no time to get in supplies before the winter, but in the spring there will be no scarcity. To show the faith which the Governments of British Columbia and Vancover's Island have in the new mines, I will state what they have done. In the first place, they are laying out over $25,000 to complete the wagon road to Lake Kamloops, and have given a subsidy to two steamboat companies of over $60,000 to run direct from San Francisco to Victoria and New Westminster. In addition to this the Hudson Bay Company are building a new steamer on Kamloops Lake, in time for the spring trade, to the mines exclusively, at an outlay of over $50,000. This is evidence sufficient to convince anyone, more especially as the Government of British Columbia have had officers of their own through the mines to report on them before they went to any outlay whatever. I must not conclude without mentioning that the obnoxious gold export tax will be abolished immediately by the British Columbia Government.

New Granada.

The Panama correspondent of an exchange writes last month as follows: The town of Barbacosa, around which the mines are located, contains at present about two thousand inhabitants, principally negroes, and the entire district about six thousand. It is some forty miles from the port of Tumaco, and is reached by canoes, the time occupied by the journey being six to eight days, as the canoes make but little progress against the strong current. Hitherto, many of the natives have made their living by gold washing, but they have worked in such a slovenly manner that their earnings rarely exceeded twelve to sixteen dollars per month. Provisions are brought in considerable quantities from Pasto, by the Indians, and

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SALUTATORY.

Buoyed up by the kind assurances of many influential friends—some of them well known in their several departments of science—I assume editorial control of the JOURNAL OF MINING with a determination, so far as lies within my capacity, to make it a *success*. Puffery is my special abhorrence, and so long as I conduct the JOURNAL nothing of the kind shall be seen in its editorial columns. Politics—in the popular acceptation of that term—will be utterly ignored, because incompatible with the spirit and scope of such a paper. Without any farther promises, I prefer to let the JOURNAL stand upon its own merits. GEORGE FRANCIS DAWSON.

APOLOGETIC.

A great deal of valuable tabular matter has unavoidably been omitted in this issue, but will certainly appear in that of next Saturday. Journalists and printers will understand the reason when we state that a vast amount of "sorts" were needed; these had to be cast at the type foundry to order, and were not done in time. We are also having "minion" cast for the Mining Summary of our next issue, the use of "brevier" in this having crowded out our Oil Summary.

THE GREAT OVERLAND ROUTE—PAST AND PRESENT.

Nearly twenty swift-winged years have passed since the first intelligence of extensive gold discoveries in the Dorado of the West startled the denizens of the Eastern portion of the United States. Since then, old men of that day have been gathered to their fathers, the middle-aged have become old, the young have become elderly, and the babe in arms now sports the whiskers of young manhood. Nearly twenty years, pregnant with great events in the political, financial, and scientific history of this, and many another nation of the globe, have gone by, and the giant of the New World has outgrown the disease that threatened his young life, and now stands in robust manhoood, towering above even the giants of the Old. Twenty years ago monitors were unthought of. The man that declared a great armed rebellion probable was disbelieved. He who dreamed of the possibility of a million and a half of American citizens engaged in opposing ranks, in deadly conflict, upon the soil made sacred by the dust of Washington, Jefferson, the Adams', and others of the patriot fathers, would have been looked upon as a lunatic, did he give voice to such a vision. Yet these things have come to pass—and more. An old and once faithful ally has been seen to take advantage of our temporary weakness. Autocratic Russia has been seen to grasp with friendly warmth the hand of Democratic America, and the grip was as generously returned. The electric telegraph has been so improved that circuits of thousands of miles are little thought of. The continents have been spanned by these vocal wires, and it is considered feasible to hold even sub-oceanic converse through their instrumentality. The wildernesses of the interior have been made to bloom with the flowers of civilization. The "unexplored Indian Territory" has been divided off into Territories, and many of those Territories have ma'ured into full-grown States of the Union. Our public domain, population, manufactures, scientific knowledge, commerce, mineral and other wealth, have grown amazingly, and our influence and power have advanced in like ratio. With such great interests scattered over so vast a country, not by any means the least noteworthy deed of the period referred to, was the building (and keeping in good order) of the great overland mail route. We send letters to and from Kansas, Colorado, Utah, Nevada, Montana, Idaho, and elsewhere in the extreme West, and think there is nothing strange in *that*—because we are used to it. But go, speak—some twenty years back—to any of that long line of travel-stained emigrants, toiling their weary way up the steep slopes and down the deep gulches of the Rocky Mountains, along the burning sands of the Alkaline Desert or among the drifting snows of the lofty Sierras Nevada; tell him that excellent railroads would take him from any part of the "States" to Atchison, Kansas, and a first-rate Concord stage would gallop him, in a couple of weeks, along a first-rate stage road, from Atchison to a point near the eastern boundary-line of California, from whence he could go by rail and steamboat in a few hours to San Francisco—he would simply say: "Impossible!" Yet all this has been done, by the commanding genius—for it is nothing short of it—and indomitable energy of one man: Ben. Holladay. Some five or six years ago he took hold of the overland stage enterprise, and constructed a turnpike at his own expense—General Bela Hughes (also a man of remarkable energy) superintending the work—for a distance of some 600 miles right through the gorges of the Rocky Mountains, from Central City in Colorado to Great Salt Lake City in Utah! To any person at all acquainted with the topography of the country through which this gigantic undertaking was carried, the successful completion of the work must appear marvelous. Yet in spite of all, Mr. Holladay has triumphed. He seems to hold with France's greatest Cardinal:

"There is no such word as 'Fail!'"

This is literally true of Mr. Holladay, whether we look at his operations on land or water, by stage or ocean steamer. But turning from the creator to his great work, we find that his overland Mail and Express Company runs a daily line of stages from Atchison, Kansas, via Denver City, Colorado, to Great Salt Lake City, Utah; thence a tri-weekly line to Bannock, Virginia and Helena, in Montana, and Boise City in Idaho, connecting also at Salt Lake with daily stages that run through Austin, Carson and Virginia, in Nevada, to Placerville and Folsom, in California, besides running a daily line from Omaha, and a tri-weekly from Nebraska—to connect with the main line at Fort Kearney—and a daily line between Denver and Central Cities, in Colorado. The main trans-continental line of stages, with the various branches, traverse thousands of miles. No less than 156 coaches and express wagons, 825 men and 3,530 horses and mules—1,490 of which are needed to haul supplies for the 250 stations at which changes are made, and the wants of the inner man cared for—are employed on this great thoroughfare. Every reasonable attention is paid to the comfort of the traveler, and if he desires to stop anywhere on the road, and resume a seat when the coach is not full, he is allowed the privilege. We have been thus explicit in relation to the overland stage route because we are frequently questioned concerning it; because there will be a great migration westward this spring and coming summer, and many desire such information; and because we think that the genius that inspired such an undertaking, and the persistent energy that accomplished it, deserve this slight tribute at our hands.

A GLANCE AT THE MINING SITUATION.

It is idle to deny the fact that the present is rather a dull season in the mining stock market. Whether it is owing to the weather, to many recent heavy failures, to satiety, or what not, the fact remains the same. The season is dull; that this is not the fault of the mines is very plain. The gold and silver mines of Nevada, Montana, Idaho, Colorado, Arizona, Oregon and New Mexico, never yielded larger returns. Those of California manifest decided symptoms of improvement. The copper product of the great copper region bordering Lake Superior exhibits no decrease; and the coal, iron and lead mines of Pennsylvania, Wisconsin, Illinois, and other States, certainly hold their own. Most encouraging accounts as to the mineral wealth of Virginia, Georgia, and others of our Southern States also continue to come in, to the great astonishment of those who in their eager westward gaze have hitherto overlooked the vast treasures lying buried almost at their own doors. The petroleum product, in spite of the heavy tax imposed upon "crude," is growing, and when Congress shall have lifted the galling burthen from the producers shoulders, it must become a highly remunerative branch of mineral industry. The excitement relative to Montana and Idaho, does not seem to have been materially affected by the glowing accounts from New Granada, and the more recent reports from the Big Bend mines, in British Columbia, although bearing the imprint of truth, serve but to increase the bent of many adventurous minds to swell the populations of those two favored Territories, as by travelling *via* San Francisco and Portland, to either Montana or Idaho, they might visit Big Bend without diverging much from their line of travel. The coming month of May will undoubtedly witness an unusually large migration to the far West, of those anxious to make their fortunes by practical mining. Already we hear of several large parties in this and other cities, that have been formed for gold hunting, and are only awaiting favorable weather to start on their long journey. Colorado, doubtless, will also receive a fair share of the overland pilgrims into her bosom. In fact *all* the Western States and Territories will be more or less benefitted by this westward movement. As Spring advances confidence in mining investments will doubtless in-

crease; but, after the many severe lessons they have hitherto learned, it is to be hoped that capitalists—whether large or small—will not again embark rashly in wild ventures. The insane spirit of speculation has been too common. Mining can never, as a rule, be profitably conducted, unless as a legitimate business. But *as* a business it can, without doubt, be carried on most remuneratively.

COMPRESSED AIR.

Compressed air, as a motor and medium for ventilating mines, has now been brought into practical and successful operation, and the day cannot be far distant when it will be in general use. Compressors are manufactured in this city, with which a pressure up to 220 pounds is readily attained. Practice at the Mount Cenis Tunnel has demonstrated that at the distance of two miles from the Air Receivers the loss of power is less than five per cent. In several places in Europe, machinery in mines is driven by compressed air, which, when exhausted, cools and purifies the atmosphere. At the mines of the Cambria Iron Works, Johnstown, Penn., it has been successfully applied to driving coal-cutting machinery. Immense expenditures and great loss of time have heretofore been necessary to secure ventilation in mines by the sinking of shafts, and driving air entries, etc. By the introduction of compressed air these outlays can be almost entirely avoided, now that we have a power at hand available as steam for doing our mining work at points where steam cannot be used. We must seek out and set to work the best machinery for drilling the rock and cutting the coal. More than three years of steady work at the Mount Cenis Tunnel, and almost as long in English mines, demonstrates the fact that there are machines to be had which will do good work, and have them we must; if our own countrymen cannot furnish them we must import them or be behind the age. Is it not remarkable that in the department of mining and drilling rocks, few, if any, improvements should have been made, while in almost all other branches of industry the advance has been marked and regular. The time has now arrived for rapid development of the unbounded mineral wealth stored up in the bowels of our western world. That development should, and we trust will, be not only rapid but comprehensive and systematic. To accomplish this desideratum, mine superintendents must disenthrall themselves from the influence brought to bear upon them by the contracted ideas and clannish habits of Cornish mine laborers—perhaps of all men the most obstinate and troublesome to deal with.

MANUFACTURING AND MINING DEPARTMENT OF THE TREASURY.

From Washington correspondence in the daily press we learn that during the past week, Mr. Grinnell, in the House of Representatives introduced a bill "to establish a manufacturing and mining division in the Treasury Department," which it is stated, has for its general design the acquisition and diffusion of information relative to manufactures, and the aiding of Congress in legislating thereon. We presume from its title that the bill has a wider reach than the correspondent indicates; that the duties of the commission to be appointed under its provisions will include the collecting, digesting, and furnishing to Congress information relative to the mining and milling interests of the United States, as well as with reference to "manufactures, consumption of raw material, etc.," and the general course of trade with foreign countries." If our surmise be correct, we cannot refrain from entering our protest against such a measure. On the principle that "half a loaf is better than no bread," many persons interested in mining may be induced to give it a lukewarm support; but taking into consideration the vast mineral riches of this country, the immense amount of capital already invested in its mines and mills, and the large revenue (direct and indirect) therefrom derived—to say nothing of the inestimable service rendered to the country during the recent rebellion by these ever flowing streams of hard-cash wealth—we cannot avoid the conclusion that the advocacy of such a half-and-half bill, in Congress or out of Congress, would be an ungracious if not ungrateful act. That which the mining community desires and should have—and which Congress, if desirous of legislating for the good of the nation, will take care that it shall have—is a separate, distinct mining Bureau. There will be quite enough work for one commissioner and a dozen clerks in such a Bureau, without bothering about the "course of trade," "manufactures," "consumption of raw material," and what not.

Earthquake.

By telegraph, information comes to hand that San Francisco and other parts of California were visited on the 25th by an earthquake more severe than any in her past history—save the memorable one of October last—but this time Gilroy was the only town that suffered.

Central Pacific Railroad.

It is reported on good authority, that the Central Pacific Railroad—in course of construction from Sacramento City, California, to Salt Lake City—is rapidly progressing. Fifty miles have been completed and the working force will be largely increased this spring.

Colorado's Position.

It is stated by the Washington correspondent of the *Herald*, that "it is claimed that Colorado will be admitted on a pledge of the Senators to go against the President."

Copper Memorial.

The Detroit Board of Trade have adopted a memorial to Congress, asking an increase of duty on copper, so as to protect the copper interest of Michigan.

Magnitude of Our Western Mining Regions.

Few have yet begun to realize the extent of the twelve States and territories on our Western borders, whose vast stores of mineral wealth are yet to attract teeming multitudes to them. California has 158,685 square miles, containing 101,658,680 acres; Dacotah, 148,832 square miles—95,316,480 acres; Nevada, 81,539 square miles—52,184,960 acres; Colorado, 104,500 square miles—66,880,000 acres; New Mexico, 121,201 square miles—78,568,640 acres; Arizona, 126,141 square miles—80,730,140 acres; Utah, 106,382 square miles—68,074,480 acres; Oregon, 84,248 square miles—60,958,720 acres; Idaho, 326,375 square miles—208,878,726 acres; Nebraska, 75,955 square miles—44,796,160 acres; Washington, 66,994 square miles—48,636,800 acres; Kansas, 81,318 square miles—53,043,550 acres; making a total of 1,495,310 square miles—957,720,400 acres, of which only 61,738,546 acres have been disposed of. Idaho alone will make five States as large as Pennsylvania.

Emery.

The world's supply of emery has within a short time been (prospectively) doubled. Hitherto two places—Cape Emeri, in the island of Naxos, and the neighborhood of Smyrna—have furnished nearly all the emery used. A few years ago a mine was discovered in North Wales, and another, perhaps the most important deposit of the kind in the world, has just been discovered in Chester, Mass. This latter yields emery of the finest kind, and which does not rust upon exposure to the air. It is also reported to be capable of doing one-third more work than any other emery in the world. Its non-liability to oxydation also gives it great superiority. This mine is now worked or preparing for work, and, instead of "Turkish" emery being the favorite brand, "American" will be likely to take its place.

Original Papers.

By publishing contributions, the JOURNAL OF MINING *does not necessarily endorse the positions assumed by contributors.*

WRITTEN FOR THE JOURNAL OF MINING.

PETROLEUM.—Number One.

By FRANCIS E. ENGELHARDT, Ph. Dr., Professor of Chemistry in St. Francis Xavier's College.

The name "petroleum" is given to a number of substances that appear when first formed to have had the same composition, but which were changed more or less according to circumstances by physical and chemical causes which acted upon them during the long periods of time they were enclosed within the rocks of our globe.

The word petroleum is of Latin origin, derived from *petra*, rock, and *oleum*, oil, indicating both its origin and nature. But as petroleum is a substance that was known for centuries—as I shall presently show—it received various names according to its consistency; thus the thin and clearer variety is called naptha, petroleum, mineral oil, Seneca oil and Barbadoes tar; the darker and thicker kind, which at the ordinary temperature forms a solid bitumen: bitumen asphaltum mineral pitch, and asphaltum judæicum, from its occurrence in the Dead Sea in ancient Judea.

Petroleum in its various forms was known in most remote antiquity. The Egyptians used it in embalming their dead. The Jews employed it as a cementing material for their edifices, and the inhabitants of ancient Memphis covered the lower parts of their dwellings on the outside with asphaltum in order to preserve them from the dampness of the surrounding soil. Moreover, the present petroleum well of Zasynthus, one of the Ionian islands, was known to the historian Herodotus, consequently more than 2000 years ago.

The Greeks and Romans called it "pitumen" from Pitta, (pitch, as we read in Tacitus, Pliny and Vetruvius,) and the last named author who was himself an architect, considered it as the best cementing material for buildings at that time known. Plutarch described most beautifully the magnificent spectacle of a burning sea of petroleum near Ekbatana, and Dioscorides relates that petroleum was collected for being used in lamps near Girginty, the (Agrigentum of old classic Rome) in Sicily, from whence it derived its name of Sicilian oil.

Even Semiramis, if we can rely on the testimony of the historian Diodorus Siculus, employed it in the construction of her hanging gardens at Babylon, and the walls of that far famed city were built with mineral pitch. Many of the ancient so-called perpetual fires that burned upon the altars of heathen antiquity, are supposed to have been burning petroleum springs. For instance, the holy fire of Bakoo in the province of Shirwan, which even now in the nineteenth century receives religious worship as of yore.

Some also assert that both naptha and bitumen were used as ingredients in the celebrated Greek fire. Eusebius mentions the fact that on the birthday of our blessed Redeemer, an oil well sprang up in the Jewish quarters of Rome flowing only for that one day and then disappearing forever, reminding us of the prophesy in Solomon's canticle of canticles: "Oleum effusum nomen tuum." Thy name is as oil poured out.

The inhabitants of Persia, the Birman Empire, India and China, have since time inmemorial employed petroleum for artificial light, and even the wild sons of the Arabian desert use a solution of asphaltum as a protection for their horses against the stings of insects under that burning sun.

In Modena and Parma, oil was discovered in 1640, and has ever since that time been obtained by sinking wells into the ground. This oil was used formerly for the illumination of the streets of Amiano and Genoa in Italy

Mr. Young, of Glasgow, Scotland, hearing in 1847, of the discovery of an oil well at Reddings, in Derbyshire, purchased it, and by a refining process of his own manufactured from it a good lubricating oil, till the well was exhausted, when he turned his attention to the distillation of coal, which had been already investigated in 1830 and 31 by the German savant Reichenbach,

who discovered in the coal tar the parafine now so much employed in the manufacture of the parafine candles.

In this country, petroleum was first discovered, according to a legend of the Indians, by one of their chiefs, to whom the Great Spirit had revealed its situation and medicinal properties, and they sold it under the name of Seneca oils many years ago to the first settlers in Pennsylvania. They also used it mixed with various paints, to anoint themselves for war, and employed it in various religious rites.

The early settlers of our country collected petroleum at Oil Creek, Pennsylvania, for medicinal uses, amounting in some years to as much as twenty barrels.

As early as 1819, Dr. Hildreth, of Marietta, Ohio, mentions the sinking of two wells, four hundred feet deep, on the Little Muskingum river, for brine, of which one yielded brine, but the other oil; and he remarks that "the oil was profitable, as it gave a clear, brisk light and was in great demand for factories and workshops."

The same happened to Louis Peterson, Esq., of Alleghany Co., Pa., when he was boring two wells for brine in 1845. They yielded him from twenty-five to thirty gallons of oil per day.

Notwithstanding these successes, it was not until 1850 that a lasting impetus was given to this branch of our now flourishing industry, by Colonel Drake, of Mass., who on the 26th of August of that year struck oil seventy-one feet below ground, at Titusville, Oil Creek, Pa. Putting a pump into operation, he produced about one thousand barrels of oil in a single day. Since that date, as everybody knows, the oil produce of this country has been indeed marvelous, and to him, therefore, more than to any other man, our country owes the greatest gratitude for the rapid development of its oil resources.

Having traced the history of petroleum from the time it was first observed by man, down to our own days, let us come at once to the more important question of its origin and occurrence in our rocks.

A number of theories have been advanced by scientific men as to the origin of petroleum. All agree in considering petroleum a substance which was not originally created as it is now found in the earth, but rather as a product of chemical or physical action, during long ages, upon organic remains, either animal, vegetable, or both. These organic remains were once actually existing upon our globe in the form of animals and plants, which were swept from its surface by some grand catastrophe, buried among the solid rocks, and here acted upon by different agents, such as water, heat, pressure and the like. This action had its final result in the formation of the different oils and bitumens. To be more explicit, I shall state now some of these theories.

One of them, then, considers petroleum as a product of Coal.

It is well known to most readers, that there exist two kinds of coal, the anthracite—a hard shining variety that gives a great heat, but little or no flame; and the softer and less shining variety: bituminous coal, which, when burned, gives volumes of smoke, a bright light, and less heat. But the main difference between the two, and to this I wish especially to call attention, is, that the anthracite when heated in closed vessels such as the gas retorts of our gas works, yields neither gas nor tar, while the bituminous coal produces both in great abundance. The difference is at once perceptible—the one kind contains, besides carbon, such substances as, when heated, will yield gas and tar; the other is wanting in both.

Starting from these facts the advocates of the theory say: All coal was at its first formation bituminous; it contained consequently besides carbon, the elements of gas and tar, but exposed to a higher temperature within the earth, the elements of the two substances, tar and gas, were expelled in the form of vapor from the bituminous coal, and only anthracite ore (pure carbon) remained. Tar and gas, thus expelled, having no possible chance of escape through the rocks above to the surface of the earth, were forced into the crevices and fissures of the surrounding rocks. Here, under a high pressure, they cooled, became liquid petroleum, and collected in the large reservoirs or caves, with which the neighboring rocks abounded. Where the surrounding rocks were of a porous nature, such as limestones, sandstones, or schist, the condensed liquid filled their pores; and thus formed those bituminous rocks we meet with so often in the oil regions. Moreover, they hold that the formation of petroleum, and consequently the decomposition of bituminous coal, is not a thing of the past, but that it is going on still, this very day, in the coal fields of the earth. To substantiate this latter assertion, they state the fact, which cannot be denied, that carburetted hydrogen, olifian gas and carbonic acid are formed constantly wherever coal beds are found, and that it only required the condensation of some of these gases to form the oil of our petroleum wells.

This theory, I grant, may be very plausible, and may be even better explained by the use of chemical formulæ, nevertheless there are some very serious objections to its adoption in the greater number of cases, where oil is found, especially in this country.

The chemical constitutions of most of the petroleums—according to Cahours and Pelouze, two eminent French chemists—that have been investigated, never contain benzol nor any of those homologous carburetted hydrogens that are found in the oils derived from bituminous coal by distillation, and the conclusion which we consequently draw is, that petroleum could not have been formed from bituminous coal, neither by a slow nor a quick distillation, nor by a low nor high temperature, but if formed at all from coal, then in a manner entirely different from that implied in their theory.*

Moreover, the substances contained in petroleum, are very much like the compounds, which are formed of compositions, that are known to chemists by the name of fatty acids, and their alcohols, when exposed to a higher temperature.

Secondly: Petroleum is found not only in the neighborhood of coal fields but much more frequently in those regions where coal fields do not exist or are hundreds of miles distant. Whence did the oil come which is found in these localities? Shall we suppose the oil forced its way through the solid rock for hundreds of miles? That certainly would be tasking our faith in purely human expositions of phenomena too much.

Thirdly: Petroleum is found in rocks that are hundreds of feet below the coal bearing strata, and consequently it was formed, if we rely on geological science, many centuries perhaps before the coal measure came into existence.

Fourthly: Every coal stratum, as is well known, has a bed of water-proof clay immediately under its own surface; if therefore there was actually any oil formed from bituminous coal, here would be the very place to find it. Is it so in reality? No, there are no oil wells found, so far as I am aware, within the coal beds on this continent.

Fifthly: The fact that carburetted hydrogen, olifian gas, and carbonic acid, are daily formed in the coal mines, proves nothing, since the same phenomena are daily observed in rocks that contain neither coal nor bitumen, but merely organic remains.

For these reasons, to which others might be added, we are forced to abandon the theory of the formation of Petroleum from bituminous coal alone, and examine another on its merits.

The defenders of the next theory, the one perhaps now more favored in this country, assert:

That Petroleum is the result of a chemical decomposition of such plants and animals as were in existance at the period when those rocks that now contain bituminous liquids were formed.

They suppose that both vegetation and animal life partly disappeared, were buried beneath the rocks, and thus buried were changed into Petroleum.

For this latter assertion the fact is quoted, that Mr. Wall found at the Island of Trinidad, portions of wood that were partly converted into bitumen which he could remove from the woody fibre. Later observations have strengthened this fact.

The chemical changes that may have taken place in the woody fibre are now sufficiently well understood, as Mr. Stery Hunt of Canada, says to favor the idea of its transformation, or rather decomposition into petroleum-like substances, bituminous coal and even authracite, by the giving out of variable proportions of marsh gas, water and carbonic acid. We have therefore, as the first product of the chemical decomposition of wood, petroleum-like substances; as the next bituminous coal; and as the last result, authracite, or nearly pure carbon.

But the question may be asked first: Did animal and vegetable life actually exist at that distant time?

Yes, because the rocks themselves, those great monuments of by-gone ages, put up as it were by Almighty God, like milestones on the track of time, contain within their very substance, if we could say so, hundreds, nay even hundreds of thousands of petrifactions, both animals and plants, that have forever passed away. Certainly there was sufficient tissue and fibre to form all the petroleum contained in those rocks; especially when we consider, as Dr. Stephens remarks, that only a few specimens of the many that existed became petrified, as decay is the rule, and petrifaction the exception in nature. The last named gentleman, an eminent geologist of our city, has made lists of the petrefacts found in the upper Devonian strata, according to which one hundred and nine species of plants and six hundred and thirty-nine species of animals are described. How many there were that left no trace of their existence, no man is able to tell.

Secondly: It may be asked; is it possible that even animal matter may be changed into petroleum-like substances? Yes, we may suppose so, because, according to the celebrated chemist and geologist, Stery Hunt, of Canada, the animals of those periods belong, for the greater part, to the lower order; and if from the chemical composition of the lower animals, as they exist to-day, we may judge of those that existed when rocks containing petroleum were found, we may assert that the composition of the former is like that of the latter, and these are, according to chemical investigations, destitute of nitrogen, and their constitution, chemically speaking, resembles very much that of woody fibre.

Again: Even animal tissue, rich in nitrogen, has changed, under advantageous circumstances of ground, into fat. As a proof of my assertion, I need only remind my readers of such places as the old Potter's field, of this city, located between Forty-ninth and Fiftieth streets and Fourth and Madison avenues. When the human bodies there buried, perhaps only sixty years ago, were exhumed for removal, numbers of them were found entirely changed into a fatty matter, called Adiporcira. Why may not such bodies, if they remain undisturbed, perhaps for centuries, change finally into petroleum-like substances.

Again: Numbers of the petrifactions themselves, enclose bitumen within their very shells, which some may hold, with as much right, to have been formed from animal tissue, which they once contained, as others to deny, such a transformation.

Again: Some of the petroleum, especially that of the Canadian wells, has a peculiarly strong and unpleasant odor, which fact favors more, as some hold, the supposition of its formation from animal tissue than from woody fibre.

* The presence of benzol (the benzol series) in some Canadian petroleum, seems to have been proved by C. Scholemmer, Esq. He distilled the oil and treated the portion boiling below 150 deg. centigrade, (302 deg. Fahrenheit,) with concentrated nitric acid. The action was violent. Diluting the thus-formed acid liquid with water, heavy liquid nitro-compounds separated possessing the odor of bitter almonds. After he had separated the heavier compounds from the lighter ones, he added to the former, tin and hydro-chloric acid, and obtained thus a solution which, when distilled with caustic potash, yielded a distillate, which not only possessed the odor of aniline in a high degree, but also gave, with a solution of bleaching powder, the most distinct reaction of aniline. Moreover, the reaction of Rosaniline was obtained by him by heating a few drops of the oily distillate with bi-chloride of mercury.

Written for the Journal of Mining.

MINERAL WEATH OF VIRGINIA.

By Dr. E. H. Grant—late State Geologist of Virginia.

The most profound mystery of America is that there exists a belt of country on the Atlantic seaboard, within a few hours travel of New York, challenging comparison in quality, quantity, and extent with any other mining region of the globe—which has been passed by and neglected to give

preference to far distant regions. Of course some cogent reason must exist, for this anomaly among a people ordinarily supposed to be awake to the opportunities of obtaining wealth, and I propose to briefly consider them. The first and most important is that the few efforts which have been made in time past, have employed ignorant and untrustworthy slave labor; having neither energy nor self-respect, because held in a position anomalous to that designed for the human race—void of family ties, with labor unremunerated, without any legal rights or privileges, and subject to the caprice of their masters. The world has long since realized that the capacity of any class, however menial their employment, is enhanced by their personal intelligence, liberty and civil privileges. The second difficulty has been, that the superintendents and mining engineers have rather been chosen for their family position and social influence, than their practical knowledge of mineralogy and principles of mining. The third trouble has been a wasteful expenditure of money on utterly useless machinery. I have knowledge of one mine where over $150,000 has been spent for steam-engines, pumps, and shafts, which cost $100 a day, besides laborers' wages, to keep in running order, whilst on the same property existed a most valuable water power, and all the ore could have been extracted by a tunnel above water level which would have drained itself, and brought the ore to the works on a descending grade. I merely mention this as an illustration of the wasteful method which has invariably been adopted in working these mines in years past. The fourth obstacle has been the want of sympathy towards the few who have engaged in mining operations, originating, mainly, from the public interest being wholly concentrated on slaves and tobacco.

All that portion of Virginia east of the Blue Ridge known as the Piedmont district, bounded by the tide-water district on the east, is resting upon the primitive strata—Cambrian and Lower Silurian—and has been upheaved by plutonic and volcanic action. The valley of Virginia is of the secondary formation, and owes its position in the Shenandoah district mainly to plutonic, in the south-western to volcanic agencies. There has been a vast diluvial wave overspreading the State, giving evidence, in some counties, as Botetourt, of glacial action, and in others of fluvial deposit. This drift belongs to the Eocene period, and in many parts is metalliferous. There is no correspondence between the conformation of the surface of the earth and the position of the subjacent strata, except in the mountain ranges, as the valleys are mainly those of erosion and not of subsidence. The character and position of the metalliferous strata more closely resemble those of Europe, than those of Lake Superior and Missouri. There are more troubles, trap dykes, contra-lodes, and faults, than properly belong to plutonic upheavals. The igneous forces have had a much more powerful influence in the production and position of the metalliferous deposits and veins than either the aqueous, the electro-chemical, or magnetic. But since their origin they have been greatly modified by these other agencies in the diluvial deposits, but retain their original character in the subjacent strata. The metalliferous veins are rarely parallel to the strata, are frequently crossed and impoverished by fissure veins, and belong, especially in the south-western valley, to the same formations as those of Freiburg and Cornwall.

The greatest difficulty in exploring the mineral regions is the vastness and peculiarity of the drift, which frequently misleads the miner by affording surface indications remote from the true veins. Especially is this true of the auriferous belt. There, a drift of pay dirt, averaging a foot thick, has overspread a large extent of country, which frequently is found rich and constant, remote from fissure veins. This drift is not so thick as that of California, but it is easily stripped and is equally extensive, and has, in many places, yielded as much to the hand. The character of the placer gold is mostly coarse, nuggets of large size having been frequently found. I have seen many weighing over an ounce apiece, and have one weighing about two ounces, which has been declared, on careful inspection, to be superior to Australian gold.

The gold ores which have proved by test and assay most profitable in Virginia, do not usually show gold under the lens. It is, therefore, fine, and in many cases may be chemically united with the chlorides and sulphurets and be precipitated by water or heat in the process of extraction. The best gold ores of Virginia—the sulphurets of arsenic, iron, lead, copper, and ferruginous and aluminal clays, and the talcose slates—have never been worked to any extent. Therefore, they have yet to become the subject of exploration and practical manipulation. I have made several tests, which warrant me in declaring that these sulphurets and clays will yield gold equal to any ores hitherto brought before scientific and practical mineralogists. The usual rule in mining in Virginia has been, that at a depth of fifty feet and upwards sulphurets predominated, and heretofore, owing to want of knowledge of method of treatment, the operations then ceased, and new shafts were sunk in the decomposed ores which constituted the surface of the veins. These ordinarily yielded from $10 to $35 a ton by assay, but much less as worked by inferior labor with the rudest processes—pans and rockers. Sluices and long toms are comparatively unknown, and hydraulic mining has never been attempted in Virginia.

The greatest difficulty in tracing the lodes has been the discrepancy between the surface and subjacent strata, the frequent intervention of troubles from trap dykes, granite and other non-metalliferous strata, the frequent intersections of contra-lodes, often of very diverse character from the vein in course of exploration, the rapid transition of the ore from kindly to intractable, from oxides to sulphurets, and the necessity of providing means to remove the abundant influx of water.

When it is taken in consideration that these mines, which can challenge comparison in quality and quantity of ore, have such great advantages in accessibility, economy of working and transportation, abundance of timber and water, are in fertile regions, having a mild and salubrious climate, where mining operations can be successfully prosecuted every month in the year, it seems impossible to believe that there will be any hesitation in developing such valuable resources. It is the surest and best known, the most accessible and advantageous field now open to the capitalist and miner in America.

MARKET REVIEW.

We notice that since August last there has been a decrease in the public debt of some $46,000,000, the amount standing now in round numers at $2,758,000,000. Under these favorable circumstances gold has gradually fallen, and the money market is now controlled by Government, not by speculators. The gold market is steadier, ranging on Thursday, from 128⅛ to 127¾, the supply of gold more abundant, although still heavily over-sold. Foreign exchanges are dull in face of the heavy amount of bills on England and France, drawn against cotton shipments. The "China" brings the report of an advance of ¾ on cotton, which naturally affects the exchanges here. The best bills on London were done at 107 per cent., good bank credits at 106¾ per cent.

The general rate for loans on California is 5 per cent., varying from 4 to 6 per cent, at which latter rate there is an excessive supply.

The best commercial paper is discounted at 7 *a* 7½ per cent., good business notes 8 *a* 9½ per cent., second grades are not readily taken.

In government securities the sales are larger and rates steadier. 7 30 per cents. are firm at 100⅛, 5 20's at 104½ per cent., and 10 40's at 92 *a* 92⅛ per cent. In Railway Stocks we have to note an unusual excitement in Erie shares, which varied from 79 to 75¾ at Thursday's board, closing at 77½.

Rock Islands also fell from 116 to 111 per cent. Other Railway stocks show no particular change, the tendency being, however, downward.

With regard to the Boston market, our correspondent writes: '*Boston and Kentucky*' sold readily a month since at $2, now dead at 95c. asked—unproductive. *Botolph Oil Well Co.* soon to be put on your market, we believe, at about $3—they own entire the celebrated Homestead Well on Pit Hole and fifty acres of land in fee—production fallen off to a few hundred barrels daily; not active. *Everett Oil Co.* Old stock has long been dull, *a* from 25c. to 50c.; preferred stock (paying about 3 per cent. monthly on $3, from its Pit Hole interests), has sold (January 25, 1866,) at $3.50, and about that time large sales were made at about $3, but it can be bought for $1.25 at present, and is dull of sale. *Indian Spring*, after a long season of inactivity, has become somewhat inquired for at 50c. to 60c. on the strength of late purchases of land in Canada, and although it may go lower, is looked upon as a good purchase at these figures. Mass. and Oil Creek having advanced from 30c. to 55c. within a few days, has become quiet at lower figures, and a further decline is looked for. It may touch 25c. *New England.*—There is some inquiry for it, at the low figures it has steadily kept for several months, say 13 to 15 per cent. *Pepper Well Petroleum Co.*, owning the Pepper Well at Bothwell and other property there, has just been organized as a Company, from the old Pepper Well Association, and no new stock has as yet changed hands, although it will, doubtless, be the most active on this market, as the old stock has been a great favorite here, having paid two 25 per cent. dividends within a few months. *Belmont Coal* is cheap at 25, and *Harleigh Coal* is also considered so at $45, as it pays 20 per cent per annum on $100, and not very long since sold for $108 *Locust Dale Coal* very seldom changes hands; it is a good thing, and is held strongly for investment. *Mammoth Vein Coal*, being about to levy an assessment of $10 per share, it has declined rapidly from $15 to $2 and $3. Sold Mch. 19 *a* 1,50—they own the most valuable colliery in the United States, perhaps, but have not had the money to carry it on. It seems cheap at $3, even with the prospect of the large assessment. *Mt. Pleasant* is sold occasionally, at about $22.50 to $23.50. Short Mountain is dull, although a pet with many coal operators—held at $26.

The Supreme Court of the United States recently decided the case of Michael A. Nolan and others, vs. the Board of Assessors of the city of Albany, defendants in error, at the suit of Adam Van Allen, plaintiff in error, and other cases. The question presented was, whether the shares of the stockholders in the banking associations created under the acts of Congress, which provide for the creation of national banks, can be subjected to taxation by State authorities. Associate Justice Nelson delivered the opinion of the Court, holding that shares held by individuals were not a part of the capital of a bank, and must be regarded as personal property of shareholders, and as such subject to taxation by the State within the provisions of the act of Congress; but that the judgment of the Court below must be reversed on the ground that there was a discrimination between the shares of these banks and the capital stock of the State banks. Chief Justice Chase read a minority opinion, not being able to concur that a State had the power claimed, which was an indirect mode of taxing the national securities, which was not authorized or intended to be authorized by Congress.

In the case of Cutting, Fisk and others, the Court held that a broker is chargeable on purchases of securities made on his own account and for his own benefit, the same as on his commissions when purchasing for others.

Yesterday being Good Friday, there was no regular business on the Stock Exchange.

With regret we mention the suspension of the great banking firm of Culver and Penn, which is attributed to the recent depression in the oil business and decrease in value of oil lands, besides the fact that their assets had for some time been locked up in the Pithole and Keno Railroad, which was constructed at their cost.

The Ninth National Bank, we understand, is now turning its attention to the accounts of merchants and business men. The Directors, feeling the importance of standing by the community in the same

degree that they did by the Government, when it needed money, now offer to discount business paper and make collections on the best terms.

The well known Banking House of Jay Cook & Co. have opened an office at the corner of Nassau and Wall streets in this city. They now have offices in New York, Philadelphia and Washington. We presume, from the growth of their California business, that they will soon be compelled to open a branch in San Francisco.

The metal market is dull, with a tendency downward. In Iron there is a great demand, 1,000 tons No. 1. American Pig, was sold at $41. Steel is unchanged. In Copper the market for Ingot has been unsettled, though latterly more firmly held. Lead in small demand, prices somewhat lower. In Tin not much doing, prices lower both in Pig and Plates.

In Coal, prices are unsettled and the arrivals large; the price from yard is $6 to $9.50 for nut and grate sizes; Gas Coal in better deman :Haliburtons Orrel $9.50 cash.

From the Pottsville *Miner's Journal* of March 24th, we learn that the quantity of coal sent by rail this week is 52,800 tons, by canal 20,728 tons; for the week 73,528 tons, against 68,196 tons for the corresponding week last year.

The trade continues dull and prices rule low, too low to remunerate those engaged in the business.

The increase for the week is large, compared with the corresponding week last year.

The sales of Scranton coal at auction show a considerable decline on the prices obtained in February.

The low rates at which coal is now selling will cause it to penetrate distant markets and materially increase the consumption.

We learn that arrangements are being made to connect the Shamokin Valley and Pottsville Railroads with the Lehigh and Mahoney Railroad (known as Quakake) at Mount Carmel, by which passenger trains will run direct from New York to Erie *via* Sunbury. The connection, it is said, will be completed by the 1st of May.

The New Boston Coal Co. are pushing their lateral railroad from the mines at New Boston very rapidly. They expect to have it completed by the 1st of June.

As to foreign coal, we find from the London *Mining Journal* that the China Steamship Company have amalgamated with the Labuan Coal Company for the purpose of further developing the coal trade from Labuan. The produce of the mines last year was 20,000 tons, two thirds of which was good steam coal. The pit is sunk to a depth of 45 feet only, and in it are four good seams of coal—a 5 ft. seam, a 3 ft. 6 inches seam, and the lowest a 12 ft. seam, and the engineer, who was present at the meeting, and who was about to return with his family to Labuan, stated that he believed the whole Island contained coal in larger or smaller quantities. They were on the eve of getting a grant from the British government of the whole of the timber on the Island.

The prejudice against the qualities of the coal was being overcome, and the price had risen from 20s.(the price at which it was sold two years ago) to 43s. The cost of raising the coal is 9s. to 10s per ton, the average price of English coal at Singapore is 47s. 6d. to 52s. 6d. per ton.

It was found that the small coal contained a large per centage of petroleum, and that the refuse was available for patent fuel.

The great difficullty that had been experienced was with respect to labor, for which they employed coolies from China, Singapore, and elsewhere.

Salt, both Liverpool and West Indian, have been in demand, the former at $1 80c. *a* $1 85c. for ground, $2 70 *a* $2 80c. for fine. Ashtons $3 50 *a* $3 60c., Turks Island at 50c.

The quantity of salt consumed in the United States, is 28,000,000 bushels, and of this one half is imported.

The Saginaw salines, in 1860, yielded 20, 000 bushels, but in 1865, 2,260,000.

The Onondago works have increased their supply by over half a million bushels every year for the past five years, other works have also greatly increased their consumption, and fresh brine springs have been discovered, so that there is some prospect of being, in a few years, independent of foreign countries, particularly as believe the present mode of manufacture is capable of great improvement; and when we look at the increase in the British production, which, during the past sixty years, has increased from about 200,000 tons to 2,000,000 tons, of which 200,000 is consumed in the British alkali works alone.

OFFICE OF J. A. THERIOTT & CO.
PETROLEUM AND PRODUCE BROKERS,
NEW YORK, No. 5 WILLIAM STREET,
March, 30, 1866,

The market was quiet during the first of the week, and prices ruled in favor of purchasers; but to day, owing to the more favorable advices from Europe, the market has become firmer, and higher prices have been obtained for both Crude and Refined—There has been a fair business done in contracts for future delivery, at fair prices. We quote crude oil on spot, 26½ *a* 27c.; future delivery, 27½c. Refined in Bond on spot, 39 *a* 41.c: future delivery 44 c. Refined, free of tax, one pot 56 *a* 59c. future delivery 62c: Refd', in Bond, in tin cans, 49 *a* 50c. Receipts of Petroleum in N. York, since Jany, 1, 1866, bbls. 242,559: same time 1865, bbls. 98,482: Exports of Petroleum from New York, since January 1, 1866, bbls. 179,670: same time 1865, bbls. 44,419.

Respectfully yours,
J. A. SHERIOTT & Co.,
Brokers, No. 5 William street.

NEVADA STOCKS.

San Francisco Quotations.

LATEST BY MAIL.

NAME.	FRIDAY, February 23.		Sales per week Ending Feb. 23	
	Open'g	*Clos'g*	*Shares.*	*Amount.*
Sierra Nevada...	$ 8½	$ 8½	16	$ 133 00
Imperial.....	121	120	619	73.151 00
Gould & Curry...	1030	1030	39	19.750 00
Chollar—Potosi..	306	324	407	86.677 00
Yellow Jacket..	875	390	254	130.787 00
Bullion.....	.....	.....	359	23.163 00
Crown Point.....	.....	.....	88	80.920 00
Belcher.....	195	200	81	25.242 00
Overman	54	53	211	11.193 00
Ophir	425	420	683	301.571 00
Hale & Norcross	990	990	164	221 891 00
Exchequer	7¼	7⅛	456	3.392 00
Savage	800	840	220	166.128 00
Empire Mill....	185	175	83	14.990 00
Alpha.....	240	255	101	26.128 00
Blue Ledge.....	2⅛	2¼	295	655 00
Lady Bryan.	2⅛	2⅛	823	2.757 00
Daney	7⅛	7½	250	2.950 00
Wide West.....	10	10	187	1.820 00
Chas. Caney	.....	.....	.....	.....
Real del Monte..	.....	.....	9	31 00
Confidence.....	59	59	285	1.631 00

LATEST BY TELEGRAPH.

SAN FRANCISCO, March 28.

Name.	Bid per foot.
Gould & Curry	1060
Savage	1085
Potosi	425
Ophir	735
Hale & Norcross	930
Crown Point	1375
Yellow Jacket	860
Alpha	410
Imperial	130

NEW YORK METAL MARKET.

[CORRECTED WEEKLY.]

ANTIMONY.	Regulus, per lb	13 and 13 1-2 c.
	Crude,	
BISMUTH		
BORAX		35 c.
BRIMSTONE		4 3-4 c.
	Crude, per ton	
COPPER, Ingot	Lake Superior, per lb. cash, 30 *a* 31 c.	
	Baltimore,	
	Pig Chili,	
	Bolts	
	Braziers	
	Sheathing,	50 c.
	Yellow metal,	37 *a* 40 c.
IRON—PIG,	No. 1 Scotch, per ton,	$45 *a* 47
	No. 1 American,	43 *a* 45
	No. 2, "	
	No. 1 Charcoal	
BAR.	Swedish, ordinary sizes	1 60
	Amer. & Eng. refined	1 17 *a* 1 23
	" " common	1 10 *a* 1 15
	Rails, Amer. currency	85
	" Eng. gold	56
	Horse shoe iron	1 45 *a* 1 50
	Rods 5-8 and 3-16 round and square	1 22 1-2 *a* 1 85
	Band	1 50
	Nail rods, 5-8 and 3-16,	1 22 1-2 *a* 1 85
	Hoops	1..55 *a* 2 20
	Sheets, Russian, per lb	32 *a* 35
	" English "	7 *a* 9 1-2
	" American "	25
	Boiler Plates, Eng,	
	" Amer	
STEEL.—Best cast in Bars, war		22
	Best sheet cast "	22
	Best cast circular saw plates *a* 46 in	28
	Double shear-steel, war	22
	Single " "	19
	Montague & Co. C. S. in bars	c. 19
	Round machinery cast	15
	Best German	15
	Govt. German	12
	Eagle German	13
	D. Blister, war	19
	W. Jessop open blister, war	19
	Double refined	24
	Stone Axe shapes	24
	Common blister	13
	2d quality sheet	10
	3d quality sheet	16
LEAD.	American	
	German	$ 32 *a* 8 55
	Spanish	8 32 *a* 8 55
	English	8 32 *a* 8 55
	Bar, per lb	10 1-2
	Pipe and sheet	14
TIN.	Banca Govt., per lb., gold	27
	Straits	23 1-2
	English	23
TIN PLATES.—IC, 10-14 prime charcoal		$15
	1X 10-14 " "	14 3-4
	IC Coke Plates	11 1-2 *a* 13
	Ternes IC 14: 20 ch	13 1-2 *a* 14
	" " Coke	10 1-4 *a* 10 1-2
SPELTER.	American, per lb	9 1-4
	Foreign "	9 1-4
ZINC.	Mussulman & Amer	13 1-2 *a* 14 1-2
SOLDER.	No. 1,	24
	No. 2,	22

LONDON METAL MARKET.

LONDON, March 9th, 1866.

		£.	s.	d.	£.	s.	d.
COPPER.	Best selected...Per ton,	99	0	0			
	Tough Cake & Tile "	96	0	0			
	Burra Burra..... "	98	0	0	100		
	Copper wire....Per lb.			12½			
	Do. Tubes..... "			13½			
	Sheathing & Bolts Per ton,	101	0	0			
	Bottoms..... "	106	0	0			
	Old (Exchange.)..."	87	0	0			
IRON.	Bars Welsh in London	7	10	0	8	0	0
	Do., to arrive	7	10	0	7	12	6
	Nail Rods	8	7	6	9	5	0
	Do. Stafford in London	8	15	0	8	17	6
	Bars....Do	8	15	0	10	0	0
	Hoops....Do	9	5	0	10	10	0
	Sheets, single	10	7	6	11	0	0
	Pig No. 1 in Wales	4	5	0	4	10	0
	Refined Metal, Do	4	0	0	5	0	0
	Bars Common Do	6	15	0	7	5	0
	Do. Merch. Tyne or Tees	7	10	0			
	Do. Railway in Wales	6	7	6	6	10	0
	Do. Swede in London	11	10	0	12	0	0
	To arrive	12	0	0			
	Pig No. 1 in Clyde	3	18	6	4	7	6
	Do. f. o. b. Tyne or Tees	2	9	6			
	Do. Nos. 3, 4, f. o. b. Do	2	6	6	2	5	6
	Railway Chairs	5	10	0	5	15	0
	Do. Spikes	11	0	0	12	0	0
LEAD.	English Pig Common	20	5	0			
	Do. ordinary soft	21	0	0			
	Do. (W. B.)	22	15	0			
	Do. Sheet	21	10	0	21	15	0
	Do. Red Lead	23	10	0	24	0	0
	Do. White	27	0	0	30	0	0
	Do. Patent Shot	23	15	0	24	0	0
	Spanish	20	0	0			
	Sheets.....per lb.			11			
	Wire....."			10¼			
	Tubes....."			11½			
STEEL.	Swedish in Kegs rolled) per ton	13	0	0	14	0	0
	Do. (hammered)	15	0	0	16	0	0
	Do. in faggots	16	0	0	16	10	0
	English Spring	19	0	0	23	0	0
	Quicksilver per bottle	8	0	0	nom.		
SPELTER.	Foreign.....per ton.	24	0	0			
	To arrive....."	24	0	0			
ZINC.	In Sheets	30	0	0			
TIN.	English Blocks	91	0	0			
	Do. Bars in barrels	92	0	0			
	Do. refined	94	0	0			
	Banca	88	0	0			
	Straits	85	0	0			
TIN PLATES*	I C Charcoal 1st qu. pr. bx.	1	15	0			
	I X Do. 1st quality. "	2	1	0			
	I C Do. 2nd quality..."	1	13	0			
	I X Do. 2nd quality..."	1	19	0			
	I C Coke	1	8	0	1	9	6
	I X Do.	1	14	0	1	15	0
	Canada Plates per ton	13	10	0			
	In London: 2½ s. less at the works.						
	Yellow Metal Sheathing per lb.			9¼			
	Sheets per lb.			9¾			
	Indian Charcoal Pigs in London	7	0	0	7	10	

* At the works, 1s. to 1s. 6d. per box less.

Mining Summary.

[Concluded from Page 7.]

jerked beef and potatoes can generally be procured at fair prices. The cost of everything is, however, rising, in view of the influx of foreigners, of whom there are now about fifty at the mines, and the transportation of passengers from Tumaco to Barbacosa has recently been raised from three to ten dollars. Most of the necessaries of life can be procured at Tumaco, but some light woollen clothing, tents and mining implements, would be useful articles to take along. A great deal of rain falls at the mines and on the river; but India rubber clothing would be too warm, while a pair of blankets would be of excellent

service, as they could be used as such at night, and as a *poncho* in the day time. Mosquitoes are large, numerous and troublesome, so that a net is a desirable article. Thus far no quartz mines have been discovered, those worked being placer diggings, which exist extensively all over the country. A party of five Californians, who went there some three months ago, are now doing very favorably. They entered into a contract with the owner of a mine to work it on joint account, giving him half At first they took out from four to fifteen pounds per week, but since they commenced tunneling they are realizing from fifty to sixty pounds weekly, and our informant is satisfied that men who understand the business, are steady, and can keep their health, will meet with great success. Of those who have already gone there, several have been laid up with fever, which, of course, discouraged them, whilst others got on well. The last batch who went there had not got to work when our informant left; but in a few weeks more I shall have further particulars. I further call the attention of those bound to these diggings to the fact that they should not come without the necessary documents for entering their goods and chattels. The government of Colombia has rented the Custom House to an English company, and this company employs Englishmen to collect the duties. This is the reason why they are very strict in having the revenue laws faithfully executed. The duties are very trifling, but the fines pretty severe, and nobody can give as an excuse his ignorance of our laws, because our Colombian Consul will undoubtedly furnish all the information which may be desired. This law requires that three Spanish invoices be made out of provisions, implements, and merchandise imported into Colombian ports, of which the Colombian Consul keeps two, to be remitted to Bogota and the respective port. Besides, the ship's manifest has to be accompanied by a *soborbo*, which has also to be made in triplicate.

Nova Scotia.

The *Colonist* of a late date contains a tabular statement of the quantity of quartz raised, and yield per ton, the number of mines and miners at work in the different districts, etc., for the quarter ending December 31st, 1865. The total yield of the precious metal for the above period was 6,044 ozs., 6 dwts., and 15 grs., against 5,457 ozs., 8 dwts., and 5 grs. of a corresponding quarter of 1864. . . . A lecture recently delivered by Gold Commissioner Hamilton, at Halifax, is thus synopsized by a contemporary: The author commenced with a general description of the geological character of the gold districts of the province, reviewing in order the Silurian and Devonian formations, and giving an estimate of the area covered by them. The mountain ridges, crowned with chaotic masses of slate, thrown into every conceivable, or rather unconceivable position, with granite boulders resting at intervals on their rugged slopes; the courses of streams, as they rippled along beneath the shade of birch and maple, granting at intervals to the prospector the much-coveted washings from which the welcome grains and penny-weights of the yellow ore, with here and there a moderate nugget, were derived, were discoursed upon, and helped to give a zest to the more scientific portions of the paper. It appeared that no quartz-veins in this colony, properly mined, had failed to give some proportion of gold; although, of course, in many cases, that proportion was small in comparison with the amount of foreign matter crushed in order to obtain it; but, to make up for this deficiency, the well-known abundance of the metal in particular districts was enough to cause renewed exertions to be made, which rarely failed to repay the extra labor bestowed upon the undertaking. In some districts, quartz-veins occurred so often, that no less than thirty had been observed in a distance of 160 feet, and twenty-five feet of quartz had been found in a distance of 250 feet. These veins were all covered by a mass of drift. Many lodes that had been abandoned as unprolific were now in process of working by other hands, and found to be some of the very best in the province.

Mexico.

For many years, says a La Pay (Lower California) correspondent, "our mountain gulches have yielded gold, the natives making generally fair wages after the annual rains. The late dull times have sent some of our old California miners to prospect the *placeres*, and the result has been the discovery of pay dirt in abundance. Several companies have been formed, sluices are being erected, and before the next steamer leaves we may expect to know the result." . . . Another writes, Feb. 14th: We have had a little excitement here in the way of placer gold diggings, which have been found to exist some miles south of the San Antonio and Triunfo silver districts. A number of sluices have been constructed, and sufficient gold taken out to pay four and five dollars per day to the man. The diggings, so far as discovered, cover an area of about forty square miles. Water is yet scarce, but it will be brought to the place if gold is as abundant as some persons believe. The general appearance of the district is very similar to that of the auriferous hills of California.

The silver mines show little change. The Triunfo Company, which owned several of the best developed claims, has, if rumor be true, sold out to a New York Company, which will greatly enlarge the reduction works and conduct the business on an extensive scale. Mr. Mier has a mill here, and I have no doubt that he will make it profitable. Another mill is also at work with a new process, which, it is said, is very successful. If it were not for the war much more would be done. Mexico needs peace.

Falkland Isles.

A second very important discovery of coal has been made in the eastern island of that valuable British possession, the Falkland Isles. This coal seems to be different from that found by Mr. Ramsay Cooke, R. N., in 1863, being highly bituminous, and judging from a surface specimen shown to us promises to be an excellent flaming coal for steamers. Those discoveries have very great importance in consideration of the advantageous situation of those fine islands as a naval and coaling station for steamers to and from the Pacific.

Nicaragua.

There is considerable excitement in Nicaragua concerning recent reported discoveries of gold in the Chontales and Santa Rosa Districts, on the east side of Lake Nicaragua. English capitalists are said to be investing, and the mines are yielding fair results.

Patent Claims.

INTERESTING TO MINERS, MILLMEN, METALLURGISTS, OIL-MEN AND OTHERS.

The following claims have recently been issued from the United States Patent Office:

53,189.—Drilling and Driving Machine.—Israel M. Rose, New York City. Antedated Feb. 16, 1866:

I claim, First, The arrangement of the slide, D, pulley, b and ropes, a and a', substantially in the manner and for the purpose described.

Second, The combination of a paying out contrivance and tappet wheel E, with the suspension rope, a, and drill rope, a', substantially as described.

Third, The tappet wheel shaft, B, eccentric, e, pawls, c, c, and ratchet wheel, b', with the flanged drum, C, ropes, a, and a', all operating substantially as described.

Fourth, The tappet wheel, E, constructed substantially as described, out of two disks, and a transverse pin, d, and fitted to the shaft, B, so as to periodically become loose and fast on said shaft, for the purpose set forth.

Fifth, The reel, G, in combination with the tappet shaft, B, and suspended reciprocating pulley, b, the parts being arranged substantially as described.

Sixth, The application of a crank shaft, N, to the frame, A, A', of a machine adapted for pipe driving and drilling, so that said frame may be used for operating a pump, substantially as and for the purpose described.

Seventh, Constructing the jar of a drill with flanged cutters, m, m, on it, adapted to serve as reamers, substantially as described.

53,167.—Distillation of Petroleum.—Adolph Millochan, New York City:

First, I claim the method herein specified of preparing crude oil for distillation by evaporating the benzine and other volatile substances by a coil of pipe containing heated vapors and returning the condensed benzine into the crude oil, as specified.

Second, I claim supplying the crude or partially crude petroleum in a heated state from a vessel, e, containing the same to the outer still, b, and passing the condensed products of the still, b, back into the inner still c, for the purpose and substantially as specified.

Third, I claim the cock, s, or its equivalent, in combination with the stills, b, and c, for the purposes set forth.

Fourth, I claim the vessel, e, for containing crude oil, in combination with the stills, b, and c, and condensing pipes, d, and g, for the purposes and as set forth.

Fifth, I claim the conical bottom to the inner still, applied as and for the purposes set forth.

53,104.—Mode of Raising Heat by the Combustion of Fuel of Various Kinds.—John F. Bennett, Pittsburgh, Pa.

I claim the mode herein described of producing any required degree of heat for the reducing of metallic oxides, or for other purposes in the arts where high temperatures are required, by introducing two or more blasts of oxygen or atmospheric air, either hot or cold, at such different points in the furnace as that a fresh supply of oxygen shall be introduced at or a little beyond or above the point at which the gaseous deutoxyde (or acid gas) produced by the first supply of oxygen has been reduced to the gaseous protoxide (or oxide gas) by the chemical combination of one atom of the oxygen of the gaseous deutoxide with the element used as fuel, and thus, by a series of succession of combustions, continually adding to the heat produced by the first combustion, substantially in the manner and for the purposes hereinbefore described.

53,181.—Self-Acting Blow Pipe.—Moritz Pinner, New York City:

First, I claim a self-acting or automatic blow-pipe, operating substantially as herein set forth.

Second, An automatic blowing-machine that could be used for supplying or exhausting air, or both, alternately

Third, The combination of an automatic blowing-machine with a gas jet or its equivalent, so as to produce a manageable and easily transferable flame, substantially as described.

Fourth, The combination of the devices herein described or their equivalent, for heating sad irons, stoves, and other articles, for soldering, glass-blowing, and other industrial and domestic operations for producing a blow-pipe heat, and for the various other objects and purposes hereinbefore set forth and described.

Fifth, The combination of an automatic fan with an air chamber, substantially as described.

53,232.—Well Boring Apparatus.—Thomas J. Parke, (assignor to himself, Josiah Byran, Israel Gillespie and E. A. Huntsicker), Philadelphia, Pa. Antedated Nov. 8, 1865:

First, I claim the cam wheel, H, plate, J, with its pin d, and the arm, 4, constructed and operating in combination with each other and the ropes to which a rock drill is attached, substantially as described.

Second, The screw rod, N, secured to a vibrating lever in combination with the adjustable box, O, yoke, P, and clamp plates, n, n', or their equivalents, substantially as and for the purpose specified.

Third, The box, O, with its spring, K, combined with the rod, N, its nut, and the rope, X, substantially as and for the purpose described.

53,221.—Ore Washer.—George B. Hamilton (assignor to himself and Andrew Noerr), Washington, D. C.:

First, The construction and use of the oblique agitator or hollow cylinder, so arranged and operated that the water flows from the lower to the upper end of the cylinder, substantially as described.

Second, I claim discharging the washed ore through the shaft of the cylinder, substantially as set forth.

Third, I claim the use of the runks, G, for dipping the water into the cylinder, C, substantially as specified.

Fourth, I claim the combination of the cylinder, C, with the trips, I, lever, M, and sieve, K, substantially as described.

53,143.—Shaft Coupling.—Moses Hawkins, Derby, Conn.:

I claim in the method of coupling shafting, the employment in combination of one or more feathers formed on or locked to the shaft, longitudinally, a surrounding collar adapted to embrace the shaft's end, and receive said longitudinal feathers and cross keys, passing through said collar and depression across slots in the shafts, the whole arranged to operate as specified.

53,237.—Quartz Mill.—F. Sundell (assignor to himself and Anthony Chabot), New York City:

First, I claim the rotating cylinder consisting of the heads, C, C', and slats, D, and provided with the strips or plates, d, d, plate, F, feed opening, a, springs, e, and strips, f, all arranged to operate in the manner and for the purpose herein specified.

Second, One or more screens, E, applied to the cylinder to operate in connection therewith, substantially as and for the purpose set forth.

53,117.—Pump for Deep Wells.—Robert Cornelius, Philadelphia, Pa.:

I claim the supplemental annular chamber at one or both ends of the stroke, so as to form a circumferential passage for the escape of the gas between the circumference of the pump cylinder and the enlarged chamber, substantially as described.

53,142.—Mode of Melting and Aggregating Iron Chips, Turnings, Etc.—E. C. Haserick, Lake Village, N. H.:

I claim melting iron chips, shavings or turnings and other fine particles of iron loosely put in a furnace, and preventing them from being burned and blown away, by mixing them with earth or clay and water, substantially as described.

53,161.—Covering for Hose.—Thomas McAuley, San Francisco, and M. L. Cheney, Illinoistown, Cal.:

We claim forming a hose covering by winding rope or cord spirally around a cylinder or former, and having for its support warps or strands of rope or cord passing around each spiral strand by means of a half twist, substantially as and for the purpose herein specified and set forth.

53,128.—Pump for Deep Wells.—S. H. Early, Lynchburgh, Va.:

I claim the combination with and arrangement of a pump tube, having the interior tube, G, and the openings, h, in relation to each other and to the valves of the tube, a, and packing, D, all substantially as and for the purpose described.

53,194.—Amalgamator.—John T. Staats, New York City:

I claim the amalgamation of metallic ores in a closed vessel, by the joint action of mercury, mercurial fumes and agitation resulting from the rotation of such vessel, as specified.

53,145.—Drilling Machine.—John George Hirzel, Wilmington, Del.:

I claim the combination of the wheels, pinions, slides, ways, plates, springs, screw and couplings, foot piece with slide, and drill bit with heel, as arranged and described, for drilling oval or round holes, constituting a portable metallic self-acting hand drill.

53,238.—Automatic Boiler Feeder.—J. R. Widgeon (assignor to himself and Fred. E. Frey), Bucyrus, Ohio.:

I claim the segmental cog wheel, n, in combination with the chamber, A, having ports, l, m, and with the seat, B, provided with holes, d e f g, substantially as and for the purpose described.

23,208.—Method of Burning Waste Coal.—J. D. Whelpley and Jacob J. Storer, Boston, Mass.:

We claim the use of finely comminuted fuel, or dust of fuel, mingled with the air used in supporting the combustion of the gases of furnaces and fire boxes.

53,095.—Belting for Machinery.—Stephen M. Allen, Woburn, Mass.:

I claim as a new article of manufacture, belting and banding for driving machinery, prepared and possessing the qualities substantially as herein set forth.

Special Scientific Brevities.

☞ M. Perrott has communicated to the Academy of Sciences at Paris an account of his apparatus for producing very high temperature by means of coal gas mixed with atmospheric air. He unites a certain number of Bunsen's burners, so that their flames may form a single band of flame without penetrating each other, and thus obtains a column of heated gas, of intense calorific power, in such a position that its energy may be readily controlled. Into this he introduces air in such a manner that as little heat as possible shall be lost. With an apparatus consuming two cubic meters of gas per hour, he states that he has been able to melt 670 grammes of silver, and in 30 minutes to melt and run out into bars a kilogramme of copper.

☞ The ancient conduits about Jerusalem are of wonderful structure. One, the lower level conduit, formed of stone, follows the contour of the country for twenty-five miles, passing along the bend of a depression in one case of 55 feet depth, and entering the city at an altitude of 2,450. The other, the upper level conduit, is tunneled through a hill at one part, and the blocks are so keyed together as to form a complete siphon.

☞ The Suez Canal is partially completed. A schooner having actually navigated the canal from Port Laid to Suez, a direct communication between the Mediterranean and Red Sea may be regarded as an accomplished fact. Nothing now remains but to give to the canal all the width and depth necessary to insure a free passage for large ships; to finish the dykes, ports, basins, and dockyards.

☞ An English mining engineer, recently returned from the Rocky Mountains, speaking of the mines of Colarado, says:—"If there were discovered a process by which those refractory ores could be successfully and economically desulphurized and worked, there would be gambled away in Colorado, within the next ten years, more bullion than would suffice to pay the American National debt."

☞ Some meteorites which were found at Montaban, in the south of France, in 1864, and which were quite hot when picked up, consist of minute crystals of a rare kind of iron, and of sulphur, mingled with a peaty substance, which is held together by sulphate of ammonia. The sulphate dissolves when a portion of the meteorite is put into water, and the whole mass falls to pieces.

☞ The consumption of oil as a lubricator is immense. There are some railroad companies whose annual expenses are more than $25,000 for lubricators alone. A single manufacturer in England (Young) testified in court to having manufactured and sold over 400,000 gallons of lubricating oil in one year, at about one dollar per gallon. This oil was distilled from coal.

☞ The *Journal Du Havre* states that during the violent hurricane of the 11th, two hundred enormous blocks of stone, placed in front of the breakwater at Cherbourg to protect it from the action of the sea, were lifted by the waves and thrown over the wall into the harbor. Forty cannon planted on the pier were thrown into the sea.

☞ Stone is now sawn in France with great rapidity and economy by means of a perforated disk of iron on which a coating of lead has been cast, the perforations serving to connect and bind the plates of lead thus formed on the two sides of the disk. The lead is kept well covered with emery, which falls on it from a reservoir above.

☞ The United States Senate has just passed a bill giving to a New York Company the sole right to lay a cable from Florida to Cuba, on a condition that it is done within three years. It is understood that the parties will complete it at once, and extend the line down the entire length of the Southern American States.

☞ Coal was first used as fuel in London in the latter part of the thirteenth century; but the smoke was considered so injurious to the public health that Parliament petitioned King Edward I. to prohibit its burning as an intolerable nuisance. He complied, and issued a proclamation against it.

☞ The following is a good method of bronzing tin castings:—When clean wash them with a mixture of one part each of sulphate of copper and sulphate of iron in twenty parts of water; dry and wash again with distilled vinegar eleven parts. When dry polish with colcothar.

☞ Wheatstone, in 1834, ascertained the velocity of an electrical current passing through a copper wire to be 288,000 miles per second. Walker, in America, with iron wire, found the speed to be 18,780 miles. O'Mitchell, also, experimenting on some iron wire, gave the speed at 28,524 miles.

☞ An interesting volume of African exploration is announced in Germany, compiled from the papers of the late Wilhelm von Harnier, who visited Africa in 1860, and confined his explorations chiefly to the countries between Chartum and Zanzibar. "Reise am Oberen Nil."

☞ The U. S. Ordnance Department declares that ice two inches thick will bear infantry; four inches, cavalry with light guns; six inches, heavy field guns; and eight inches, the heaviest siege guns with 1,000 pounds weight to the square inch.

☞ A magnet, the lifting force of which was 220 pounds when the armature was in contact, sustained 90·6 pounds when the armature was ·250 inches distant, and 40·5 pounds when ·50 of an inch distance 4-5 of the power are lost.

☞ Another important addition to our geographical knowledge is announced as nearly ready, in five large octavo volumes, under the title of "Die Voker des Ostlichen Asien, in Studien und Reisen," by Doctor Adolph Bastien.

☞ It is said that the burning of immense tracts of peat beds in Northern Germany is the cause of the peculiar dry fogs which at particular periods sweep over considerable districts on the Continent.

☞ The decomposition of carbonic acid by plants is proportionate to the intensity and duration of the light to which they are exposed. The quantity absorbed is directly as the force of vegetation.

☞ M. de Mortillet has published in the *Sud-Est*, a Grenoble paper, a curious remedy for the sting of a dangerous insect. It is the application of the wax of the ear to the injured part.

☞ An examination into the condition of the steam boilers in New York City reveals the fact that out o 4,207 boilers, 130 were found to be defective.

☞ The gyroscope was invented by M. Foucault, and first attracted attention from its power of rendering the rotation of the earth visible.

☞ The Pacific ocean covers seventy-eight millions of miles; the Atlantic twenty-five millions.

Horace Greely on Gold, Silver and Iron.

Upon his recent installation as President of the American Institute, Horace Greely said:

A word as to our Mineral resources. We are now producing somewhat less than $100,000,000 of Gold and Silver per annum from our mines; which is more than the annual product of the whole world forty years ago—probably more than was produced in the palmiest days of South American and Mexican gold-mining. Yet, large as the amount is, it is not a beginning. That it will be trebled within the next ten years, provided our great Pacific Railroad shall meantime be completed, few will doubt who have any acquaintance with the facts. I trust the attention of the Institute will be given to this vast and growing interest—that we shall be able in some way to aid its development—and that in time the most complete and instructive cabinet of American Minerals in existence will be that of the American Institute. I would have specimens of the Precious Metals from every locality; but not of these only. There should be some place where the chemist, the prospector, the mine owner, the metallurgist, could compare critically the iron ore of Lake Champlain with that of Western Connecticut and that of Lake Superior, so as to determine wherein they agree and wherein they differ. In the first great World's Exposition of Products at London, 1851, I was not asked for specimens of California Gold; but the most eminent authority in British Geology asked me for samples of our Lake Superior Iron—then newly discovered—and I was able, on my return, to obtain and send them.

Recent Discoveries of Plumbago.

This mineral, which has hitherto ruled quite high in the markets of the world, for the reason that a good quality has heretofore been found in only a few localities on the globe, is now being found in large quantities in various parts of the earth. Large dicoveries of this valuable mineral are stated to have been made in the island districts of the Cape of Good Hope. A sample of eight bags has already been shipped to England, in order to test its value in the home market. It is found in various parts of the Eastern States; and a new and extensive deposit is said to have been recently discovered in the town of Richmond, Maine. Reports pronounce the mine one of the best in the United States. It is also found in quite a number of localities in California. Large quantities, and of a very good quality, are found within eight miles of a good shipping point in Los Angeles County. It occurs in great abundance in Mariposa County, where a new process has recently been adopted for its purification, which it is believed will prove a valuable discovery, and still further reduce its commercial value. It is found also and worked at Roger's Rock, Ticonderago, and Fiskill Landing, in Dutchess Co., N. Y., and in Brandon, Vt. A good article is found in Greenville, L. Canada, and lately other localities in Canada East show considerable evidence of it. In Buchingham, near Ottawa City quite a large district contains it in unusual abundance. Some samples which we have seen are exceedingly fine and pure, both granular and foliated, and a very recent discovery of an extensive vein bids fair to create a sensation if present reports are substantiated.—*Exchange.*

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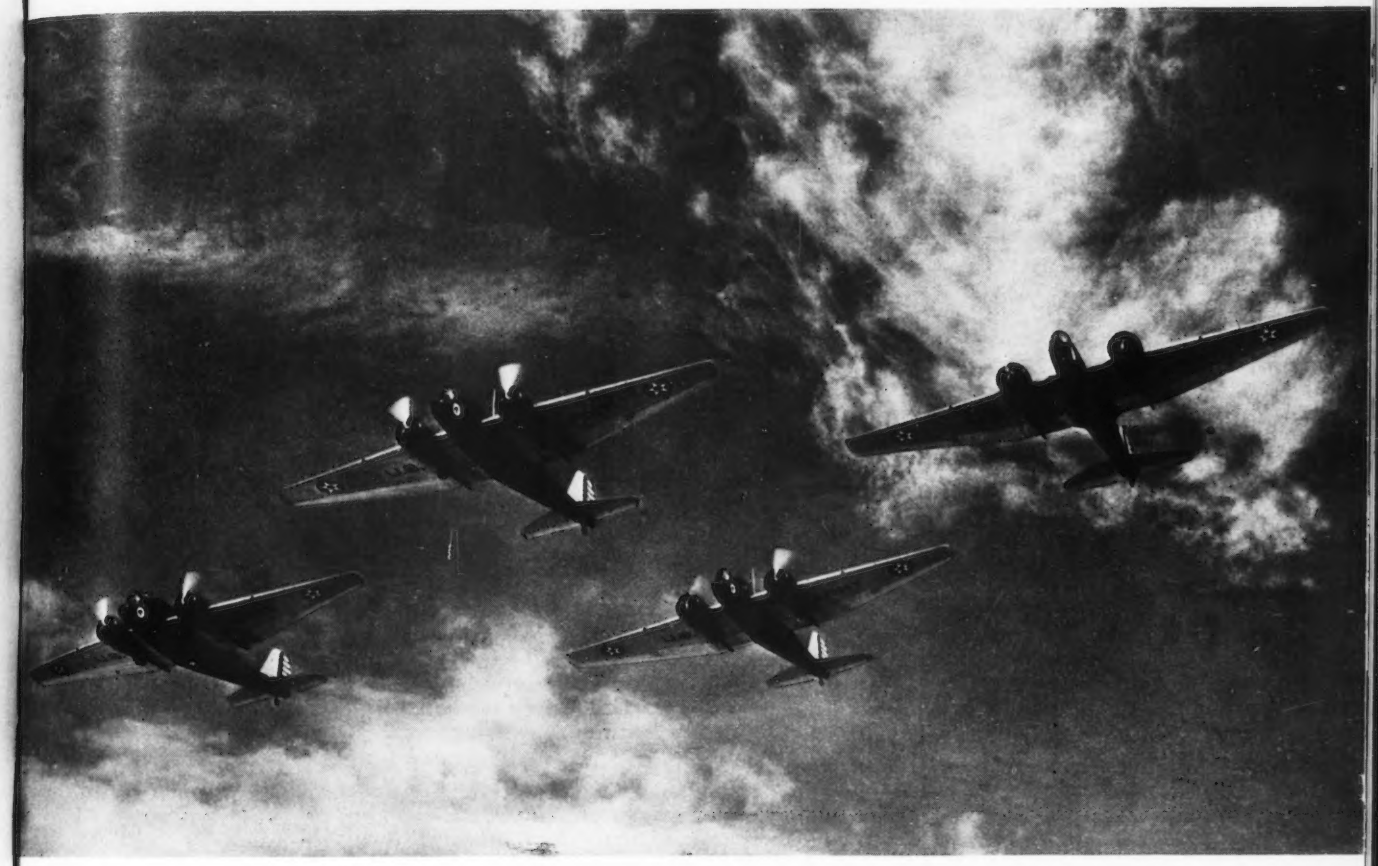

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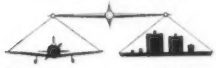

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In these days of united effort in our Country's all-out defense program, Longyear is doing its bit. Our diamond drills play an important part in the exploration and mining development of basic metals. Our shops are actively producing drills and equipment, and—delivering them!

Ready to play its part, the new Gopher Hi-Speed diamond drill is ideal for underground development either as a core or blast hole drill. A number of new features are embodied in this dual-purpose model. (1) The fully enclosed feed screw and powerful air motor form an integral unit, replacing the usual arrangement of a swivel head separate from the motor. (2) The quill and feed screw are driven directly by the motor through a set of spur gears. Bevel gears are eliminated. (3) A new arrangement of widely spaced ball bearing supports for the drive quill and feed nut gives you a steady rotating screw with a reduction in wear at high speeds and permits a 24-inch length of feed. Four feed gears are furnished. These features, available in the new Gopher, give you full power without loss; high speed; reduction in vibration and wear; and lighter weight without sacrifice of strength. You get an extremely compact, streamlined drill for convenient use underground.

TWO CAPACITIES ARE AVAILABLE

Model 30, providing a bit speed of 3000 r.p.m., will drill 250 feet. This high speed is used to best advantage in drilling solid formations or in short blast hole work.

Model 15, providing bit speed of 1500 r.p.m., has a capacity of 500 feet. At this slower speed, you get highest possible core recovery in broken formations.

With both models, using EX coring equipment, you can recover $\frac{7}{8}$" core or drill blast holes 1-3/16" or 1-$\frac{1}{2}$" in diameter to 100 feet or more. In drilling blast holes, it is desirable to use an adapter coupling which connects and accurately centers rods to feed screw, thus preventing vibration.

AIR MOTOR HAS AMPLE POWER

A powerful 9 h.p. rotary vane type air motor has speeds up to 3500 r.p.m. It can be throttled down to 1000 r.p.m. or less when required.

THE LONGYEAR ROD PULLER HANDLES RODS RAPIDLY

When holes exceed 100 feet in depth, the use of a Longyear Rod Puller is desirable and can be furnished with the Gopher drill. It will be found both convenient and rapid in handling rods in and out of the hole.

Bulletin No. E64 on the Longyear Gopher Air Drill has just been published and will be mailed upon request.

E · J · LONGYEAR COMPANY

MINNEAPOLIS, MINNESOTA, U. S. A. NEW YORK OFFICE: 1775 BROADWAY

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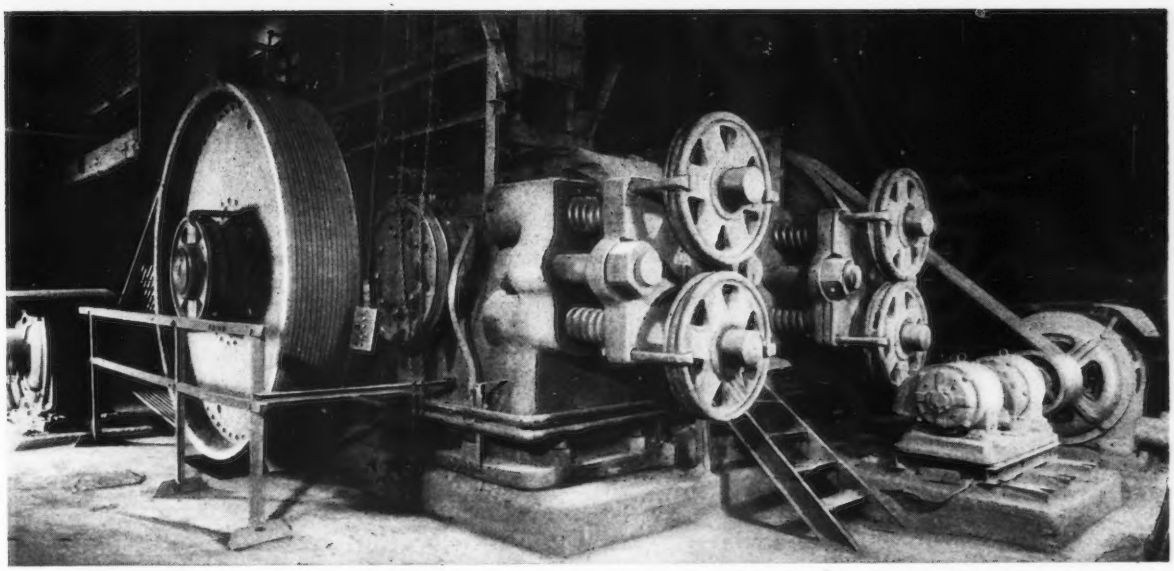
TRAYLOR
Four Tension Rod
CRUSHING ROLLS



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• *You see,* they were built especially for the kind of service that demands a maximum amount of work in a minimum period of time at the lowest possible unit cost—the ever present problem of all mining men. Therefore, the Traylor Four Tension Rod Rolls are of the simplest design, heaviest possible proportions, with satisfactory adjustment and lubrication facilities.

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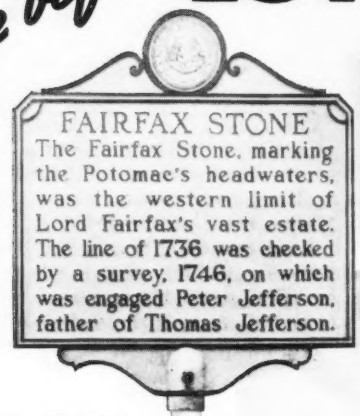

FAIRFAX STONE
The Fairfax Stone, marking the Potomac's headwaters, was the western limit of Lord Fairfax's vast estate. The line of 1736 was checked by a survey, 1746, on which was engaged Peter Jefferson, father of Thomas Jefferson.

Because the No. 322 Allis-Chalmers Type "R" Crusher can produce large tonnage of minus 3/8" product, both the Type "R" and the roll crusher operate only three hours a day... a big saving in, power consumption and man hours for the operators of Fairfax Sand & Crushed Stone.

Let ALLIS-CHALMERS COOPERATIVE

CRUSHER SETS FOR PRODUCTION EFFICIENCY!

Fairfax Sand & Crushed Stone Co., Thomas, W. Va., Increases Capacity 50% . . . Slashes Operating Costs! Here's a Typical Example of How Allis-Chalmers Cooperative Engineering Works.

A member of the West Virginia Senate for 24 years, the Honorable Abraham Lincoln Helmick is an able business man as well . . . proved by the profit statement of Fairfax Sand & Crushed Stone Co.

On the site of historic Fairfax Stone, the Honorable Abraham Lincoln Helmick, dean of the West Virginia Senate, is making profits in a crushed stone plant that operated at a loss for many years before.

Chief products are railroad engine sand and concrete sand, which formerly were made by passing sandstone directly from a 6" gyratory crusher to a roll crusher. But over-size pieces quickly grooved to roll faces . . . caused over-size material to pass through the rolls and over the scalping screen as waste for which there was no market.

Then Senator Helmick took over, called in Allis-Chalmers engineers to cooperate with him on a modernization program.

Increases Capacity 50%!

By installing a new No. 322 Type "R" Crusher ahead of the roll crusher, they not only eliminated the high percentage of waste and saved the cost of grinding the crushing rolls periodically... but capacity was increased 50%...operating time of the roll crusher cut from eight to three hours a day! In 1940 Fairfax Sand & Crushed Stone showed a profit for the first time in many years!

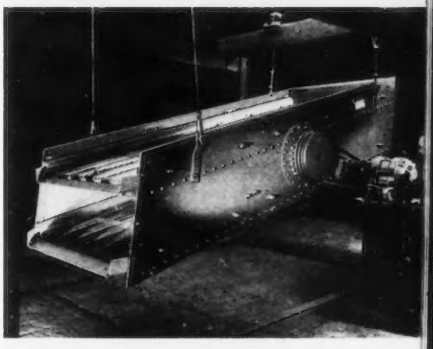
That's why Senator Helmick recently gave Allis-Chalmers the order for three modern vibrating screens and a double screw sand washer to replace outmoded equipment—made his plant 100% Allis-Chalmers-equipped!

And that's why, when a production problem comes up in your plant, you'll find it pays to call on Allis-Chalmers. Working with your own engineers, we bring the tremendous inter-related experience of the world's largest manufacturer of rock and ore reduction machinery to bear on your individual problems.

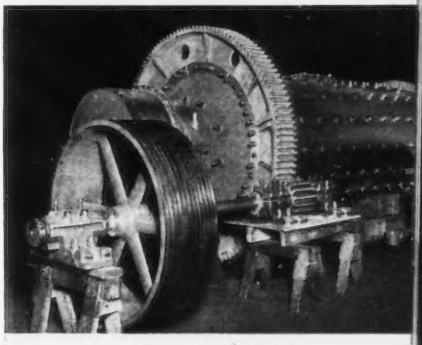
This is our cooperative engineering service. Why not let us show you how it can help you save production dollars? Write Allis-Chalmers, Milwaukee, Wisconsin.

ENGINEERING *Cut your costs*

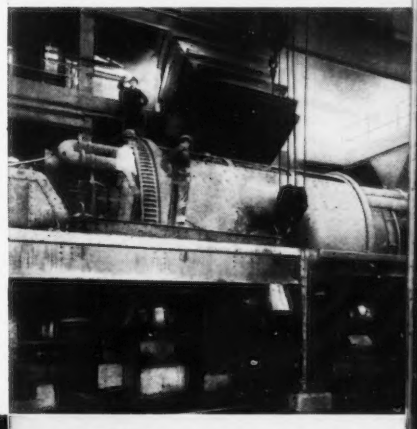
News of other Allis-Chalmers Products that cut your costs



UNIFORM CIRCLE THROW OF new Allis-Chalmers Ripl-Flo Screen im parts equal vibration to each square inch of the deck. You get exactly the right tonnage for a given angle . . . with maximum screening efficiency.



3514 ALLIS-CHALMERS CYLII drical grinding mills give better grindi at lower cost in installations all over t world. Shown here is a 5 ft by 12 rod mill arranged for Texrope Drive.



ALLIS-CHALMERS ENGINEE and builds converters for copper and c per-nickel ores in vertical and horizon types up to standard 13 ft by 35 ft si Here a unit pours blister copper i Nevada plant.

A

HARD and TOUGH FOR BETTER SERVICE

... these "500 Brinell" WALWORTH Bronze Valves

IDENTIFIED...TO MAKE RE-ORDERING EASY.
THESE VALVES CAN BE REPACKED UNDER PRESSURE, WHEN FULLY OPENED.
UNION BONNET TYPE CONSTRUCTION FOR MAXIMUM STRENGTH.
SEAT AND DISC ARE OF 500 BRINELL STAINLESS STEEL.

No. 218P Globe
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300 lbs.
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The stainless steel, plug-type seats and discs of these Walworth Bronze Valves are heat-treated to a minimum hardness of 500 Brinell (hard enough to scratch glass). Because of this hardness they have proved to be the longest-wearing bronze valves you can buy. They can be closed on sand, slag, scale, etc., without injuring the seating surfaces. "Wire Drawing" is entirely eliminated.

Maximum protection against leakage is assured by union bonnet type construction, plug-type seats and discs, deep stuffing boxes, and sturdy bronze bodies. These valves may be repacked under pressure, when fully opened. Available in both globe and angle types in sizes from ¼" to 2", they are recommended for steam, air, oil, water and gas services. For further details consult your Walworth distributor or write for circular No. 87.

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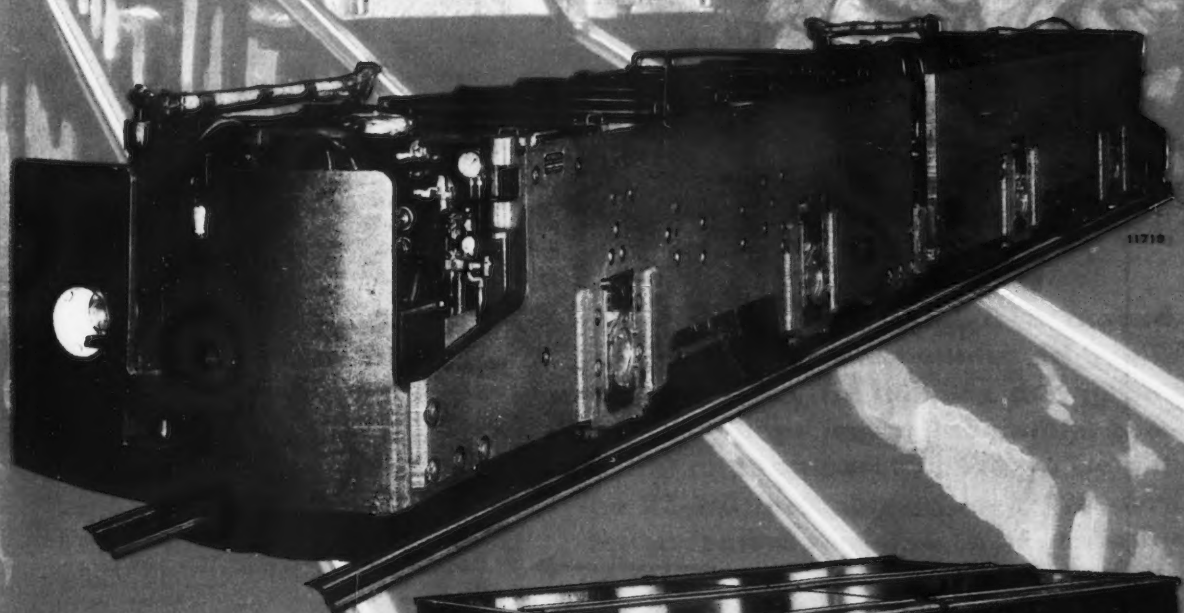
No matter what the mine transportation requirement, there is a Goodman locomotive for the job. Storage battery, trolley and combination types are built in all sizes to cover the entire range of mine services . . . and in every instance the locomotive will be built to suit your particular requirements.



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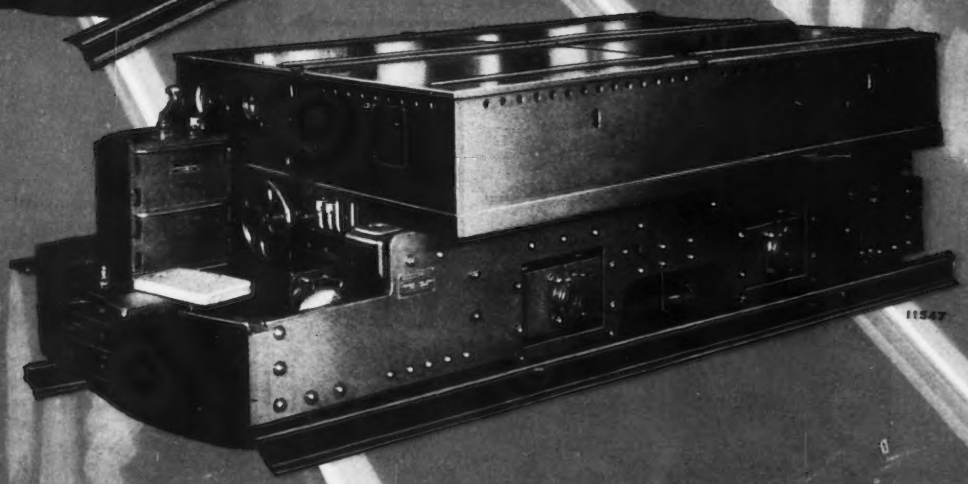

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A GEARY JENNINGS SAMPLER

for Every Sampling Need

The Geary-Jennings Sampler is furnished with the size and type cutter to meet your individual sampling needs. This sampler is built to sample most any condition that might be encountered in the sampling of corrosive liquids, pulps or dry materials. Special adaptations can be incorporated to meet practically any sampling requirement.

Type A Cutter
For wet material flowing in a sloping launder, flume or pipe.

Type B Cutter
For wet material flowing from a vertical pipe or spout.

Type C Cutter
For dry material flowing from chute or over conveyor pulley

The Geary-Jennings Sampler Completely Fulfills All Requirements for Accurate Machine Sampling

The Geary-Jennings Sampler cutter travels at a uniform rate of speed and moves completely across and out of the stream at each cut, insuring a truly accurate and representative sample.

Sample cutting is timed electrically and therefore the interval between cuts is constant, and cuts can be taken as frequently as composition of the material warrants.

The Geary-Jennings Sampler is ruggedly built with few wearing parts, keeping maintenance costs at a minimum.

This sampler is compact. Headroom and space requirements are small.

The Geary-Jennings Sampler is satisfactorily meeting sampling problems the world over which is proven by continual repeat orders. Write us today for detailed information.

Diagram of arrangement for sampling dry materials. Materials may be sampled falling from a chute, as shown, or from a conveyor head pulley.

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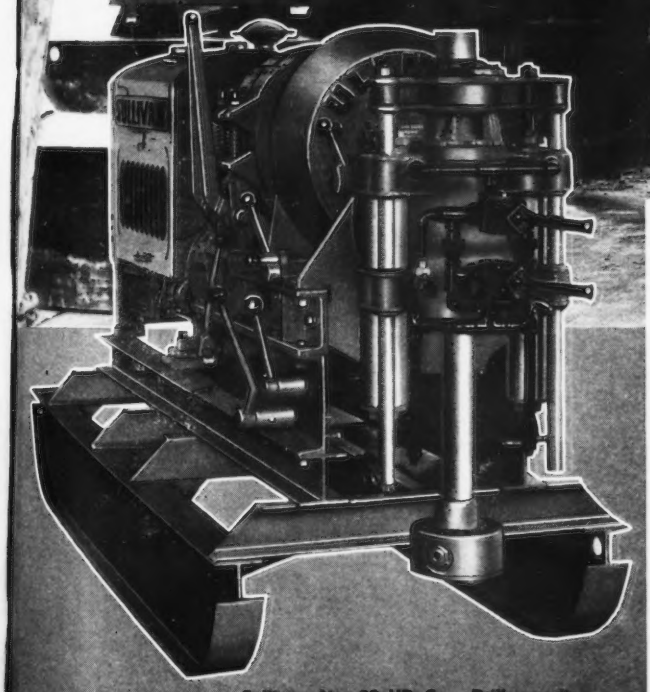
SULLIVAN
22-HD
CORE DRILL



Sullivan No. 22-HD Core Drill, gasoline engine powered, equipped with hydraulic swivelhead and built-in oil circulating system. Mounted complete on steel skids.

The 22-HD CORE DRILL is a rugged, heavy duty machine built for drilling in all formations. Its compact design and modern alloys insure maximum portability and comparatively light weight. The 22-HD incorporates every modern design feature that contributes to faster drilling, lower maintenance and greater safety. NO OTHER CORE DRILL OF EQUAL CAPACITY OFFERS ALL THE ADVANTAGES FOUND IN THE 22-HD. CONSERVATIVELY RATED AT 1750 FT. CAPACITY WITH "E" RODS. Write for Bulletin D-28.

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But no band music, no cheers fill the air around the nation's mines, mills and smelters. None are needed. The roar of production is cheer enough for thousands of men too busy to hear anything else.

Helping at every step of the way are the dozens of different HEWITT rubber products... hose, transmission belt and conveyor belt... all vitally needed to maintain split-second time-tables of defense production. Each has been developed by HEWITT research to make man-hours and machine-hours count for more. We're proud to think that, though nobody foresaw a national emergency at the time, we've specialized all these years on perfecting the equipment you need in creating today's Big Parade.

Right through to the final steps, HEWITT products help. For vital to Defense also are the HEWITT bullet-sealing airplane fuel tanks, the refueling hose, the rubber parts we are producing for military needs.

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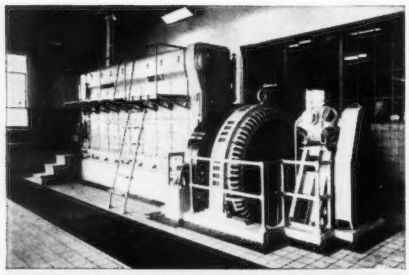
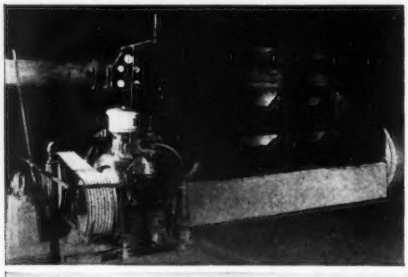
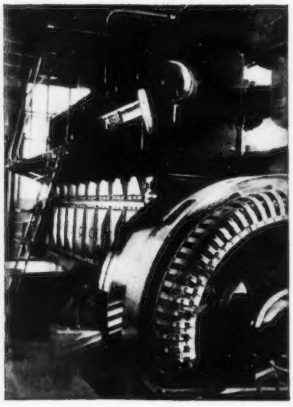
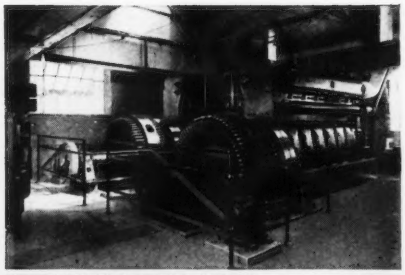
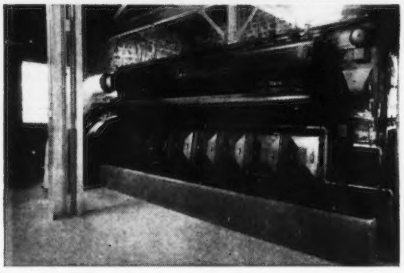










THE NATIONAL SUPPLY COMPANY... SUPERIOR ENGINE DIVISION

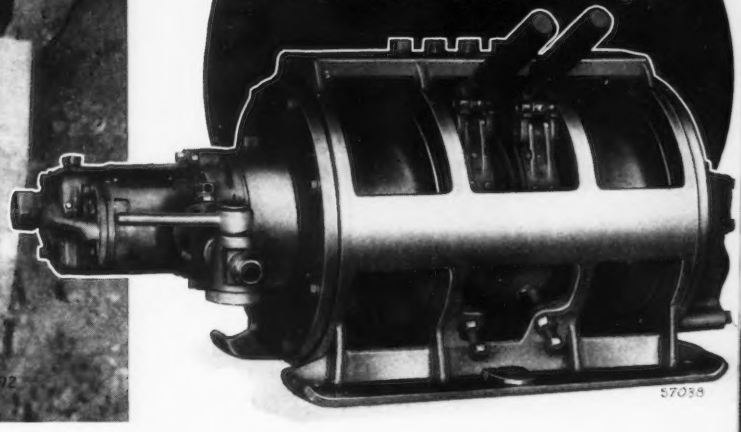
SALES OFFICES: Springfield, Ohio; Philadelphia, Penna.; New York, N. Y.; Los Angeles, Cal.; Jacksonville, Fla.; Houston, Texas; St. Louis, Mo.; Fort Worth, Texas; Tulsa, Okla.; Boston, Mass. FACTORIES: Springfield, Ohio; Philadelphia, Penna.

New Lightweight Scraper Hoist Pays for Itself in Four Weeks!

This double-drum air hoist is pulling a 30-inch all welded scraper an average distance of 60 feet to the chute. 15 tons are mucked per hour.

Western Lead-Zinc Mine Uses New I-R Portable Air Hoist in Narrow Stopes

Size A4NN-OJ
Weighs 250 lbs.
Two Men Can Carry It



THE introduction of the new lightweight, double-drum, air hoist for scraping in narrow stopes has opened a field for very substantial reductions in mucking costs. At one lead-zinc property, such savings pay for a hoist in four weeks' time.

Longer blocks of ore can now be worked out in less time than was required for the shorter blocks when they were formerly mucked by hand. The distance between chutes has been increased, thereby cutting down on raise development per ton of rock handled. Furthermore, since the blocks are mined quicker, major savings are made in stope retimbering and repairs.

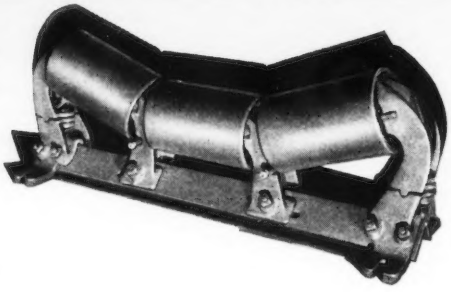
If you are faced with production problems on "short-jobs" in narrow, hard-to-handle stopes, ask an I-R man for the facts about this new unit. It is the lightest hoist of its type. You will find it a real money maker and time saver.

Ingersoll-Rand

11 BROADWAY, NEW YORK CITY

992

Atlanta, Birmingham, Boston, Buffalo, Butte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Duluth, El Paso, Hartford, Houston, Kansas City, Knoxville, Los Angeles, Newark, New Orleans, New York, Philadelphia, Picher, Pittsburgh, Pottsville, Salt Lake City, San Francisco, Scranton, Seattle, St. Louis, St. Paul, Tulsa, Washington



Strategic or Precious Metal . . . It's still the *Cost Per Ton* that counts

MERCURY, strategic metal, is processed in huge quantities at this Stephens-Adamson equipped plant in Nevada.

While mining operations at this plant are of a very specialized nature, operators had the same basic Material Handling problem as gold producers in Ontario, producers of copper in Montana, Arizona or Nevada, lead in Missouri, zinc in Tennessee, bauxite in Arkansas, or any other mine . . .

. . . namely, selecting equipment to move the ore *at the lowest possible cost per ton* over the life of the equipment.

That's where S-A Engineers come in. Their intimate knowledge of mine conveying problems enables them to bring you up-to-the-minute solutions that assure satisfaction not only today . . . but over the years. Take advantage of this S-A service and experience on your next job. *Data books on any type of bulk conveying equipment sent on request.*

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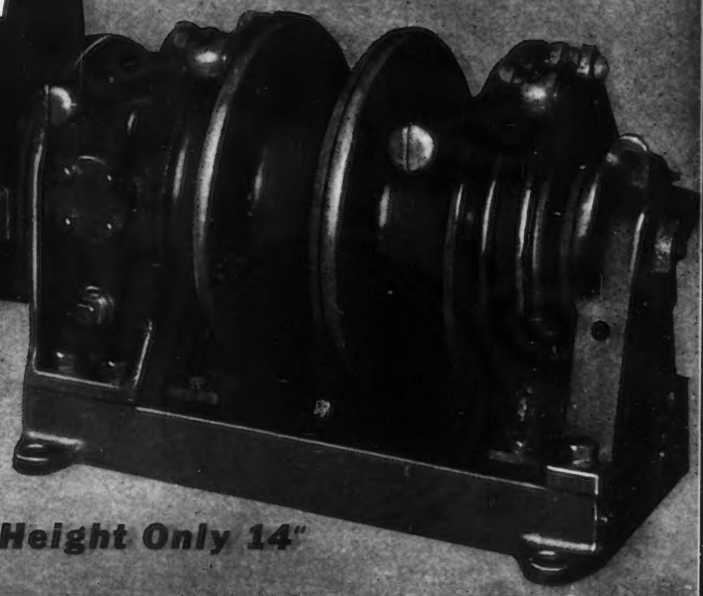
IDEALLY SUITED FOR SMALL JOBS OR IN CLOSE WORKINGS

Only 250 lbs.



Overall Height Only 14"

The S-211 Scraper Hauler weighs only 250 pounds* and is powered by a Sullivan flange-mounted "Turbinair" motor. It is only 27" long and will pass through a 12"x14" opening. With a rope pull of 1000 pounds at 125 feet per minute, this compact, powerful hauler will save money on the short jobs so frequently found throughout the mine, jobs formerly done by hand, or on small jobs which are reluctantly cleaned up with the larger haulers needed on production work. For handling ore in preliminary rounds of sub-level drifts, mucking out short crosscuts and handling waste fill, the compact, rugged S-211 will prove a labor saver on many jobs. The S-211 is also available with electric motor drive at no increase in weight.

*Less rope guides.

SULLIVAN

ROCK DRILLS • AIR COMPRESSORS
SCRAPER HAULERS • HOISTS • LOADERS
CORE DRILLS • CORE DRILL CONTRACTING

Birmingham, Boston, Butte, Chicago, Dallas, Denver, Duluth, El Paso, Huntington, Knoxville, New York, Pittsburgh, St. Louis, Salt Lake City, San Francisco, Scranton
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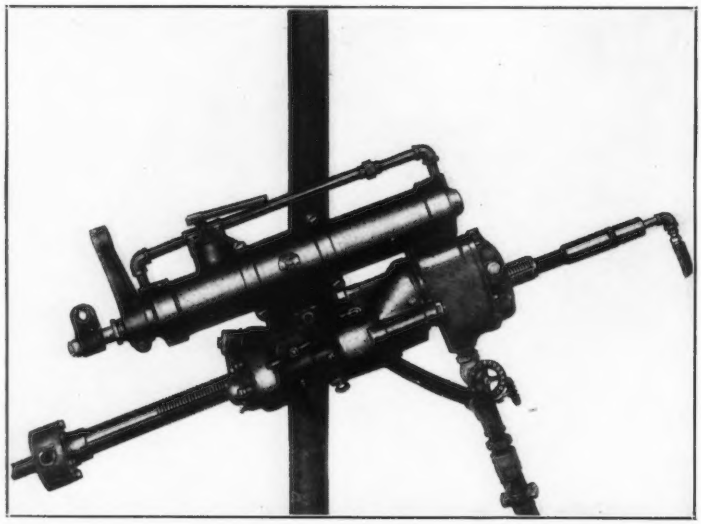
★ ★ ★ ★ CHICAGO PNEUMATIC NEWS ★ ★ ★ ★

NEW LIGHT-WEIGHT DIAMOND CORE DRILL



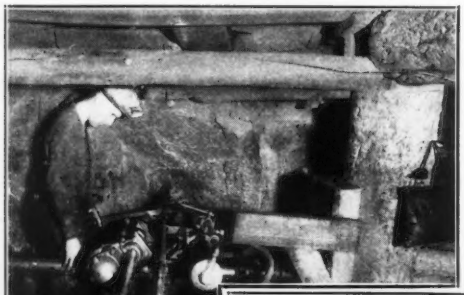
COMBINES HIGH DRILLING SPEED WITH EASE OF MOUNTING

No Costly Station Cutting

NEW YORK—New from the ground up, CP No. 5 Diamond Core Drill is faster and lighter than any other diamond core drill of the same capacity. Weight and air consumption are about the same as those of a 3½" drifter with the same 24-inch change. Ideal for short hole prospecting, underground, wall sampling, etc. Particularly adapted to long hole drilling in drawing pillars; equally good for "blast hole" drilling in drifts and stopes where conditions are favorable to that type of drilling.

CHICAGO PNEUMATIC TOOL COMPANY

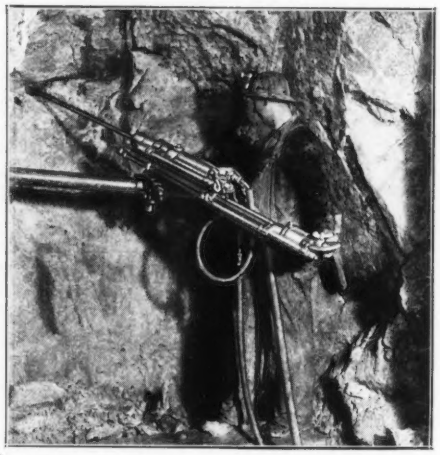
General Offices: 6 East 44th Street, New York, N. Y.



↑ **ONLY 42-1/2 INCHES OVERALL,** weighing only 250 pounds with rod puller, CP No. 5 Diamond Core Drill has a capacity of 500 feet with Standard E Rods and EX Fittings.

MOUNTS LIKE A DRIFTER ← on any rock saddle and works in any position from a column, arm or crossbar. Can be operated wherever a drifter set-up can be made.

BIT SPEEDS UP TO 1500 R.P.M., with stepless → throttle regulation. Balanced design, smooth rotary power, minimum rod vibration mean greater footage per shift, lower drilling costs per foot.



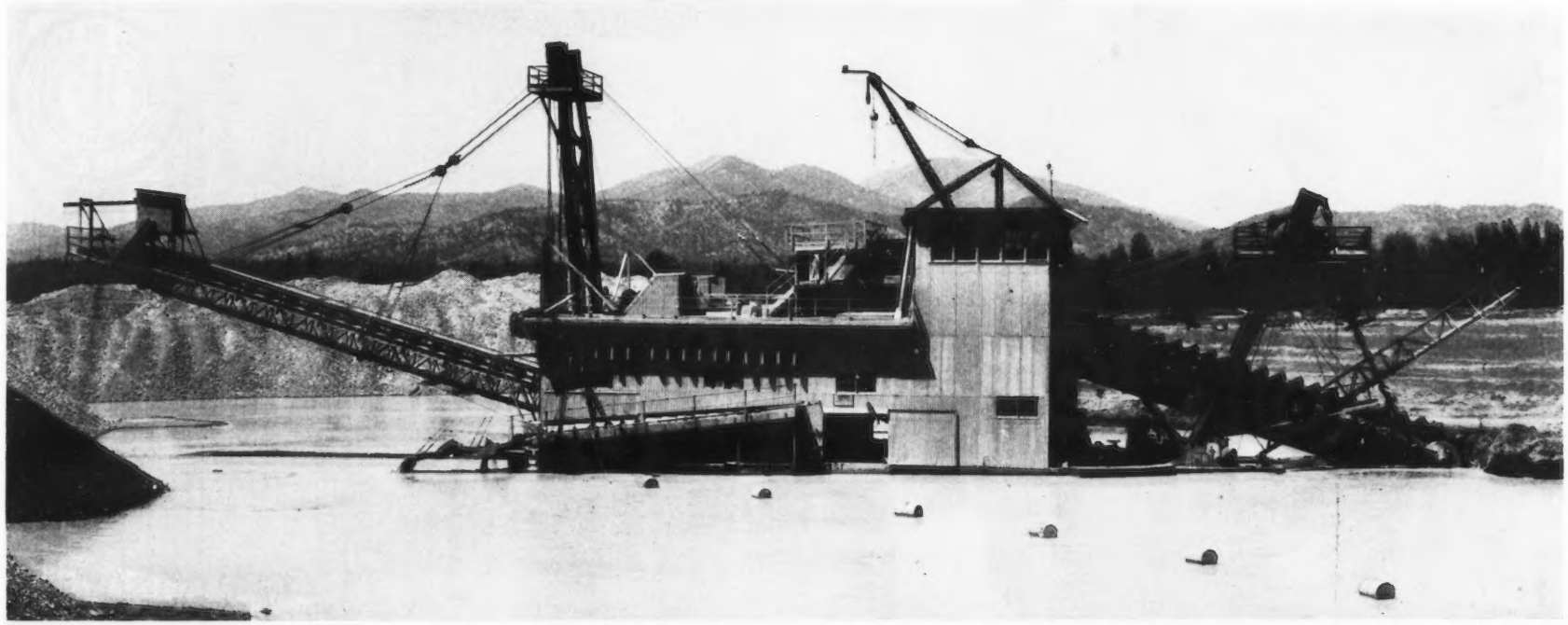
↑ **WORTHY TEAM MATE** of this CP-60 MOTORdrifter, CP No. 5 Diamond Core Drill, with its high speed and maximum core recovery, makes underground diamond drilling easier, faster and cheaper.

CHICAGO PNEUMATIC

ROCK DRILLS

ALSO: Air Compressors, Pneumatic Tools, Electric Tools, Diesel Engines, Hydraulic Aviation Accessories

DRIFTERS
MOTORdrifters
AUTOdrifters
SINKER DRILLS
WAGON DRILLS
DIAMOND CORE DRILLS



Yuba No. 149 operated by Thurman Gold Dredging Co., near Redding, California.

Another new Yuba with an outstanding record for yardage and efficient recovery on low value placer ground is pictured above. Working closely with the owners, men of long and successful dredging experience, Yuba designed and built this dredge to meet a particular set of operating conditions.

You, too, may call on Yuba for the benefit of its experience in developing your own ideas. If your present equipment needs renewing or replacing to secure greater production perhaps Yuba can offer suggestions. Yuba parts for tin, platinum and gold dredges are standard on many operations. Write direct or consult our agents.

YUBA DREDGES — PROVED DEPENDABILITY ROUND THE WORLD

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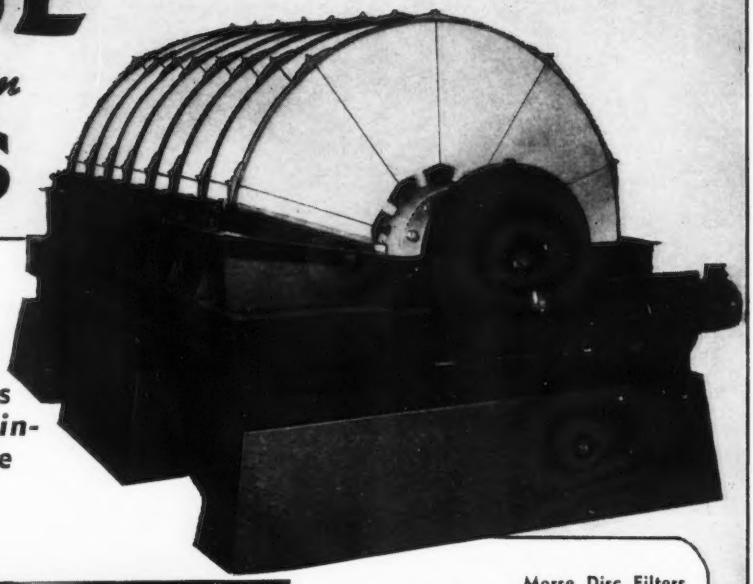
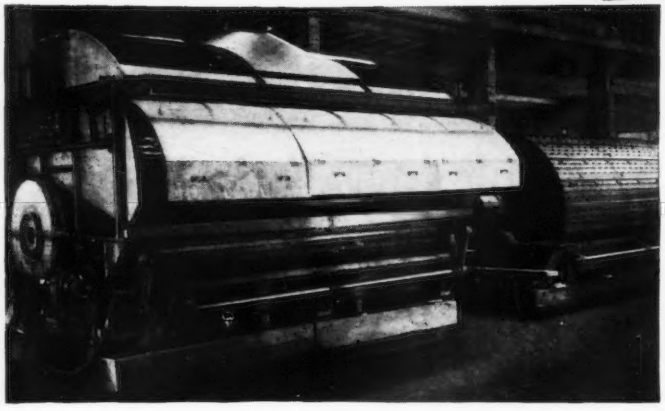
MORSE

Continuous Vacuum FILTERS



Drum or Disc Filters for all characters of Dewatering and Pulp Washing Problems Fully Automatic for Continuous Duty—Dependable Performance—Large Assortment of Sizes

Morse Disc Filters Are Ideal for Dewatering More Than One Character of Material



Morse 8'x14' All Metal Drum Filters Under Construction

Features in design and construction of Morse Continuous Vacuum Filters assure the operator of highly efficient performance and low maintenance during long and continuous periods of operation. Low submergence of filter drums and precise manufacture of valves, worms, gears, bearings and all operating parts give dependable performance with minimum maintenance. Gearhead motors or motorized vari-speed drives provide flexibility in operation and a variation in drum or disc revolutions to meet all average and special conditions. Oscillating agitators are standard on all drum filters and are powered with individual motors on large sizes of filters. Each filter is built for its specific duty and is fully assembled and inspected for mechanical performance prior to shipment. Drum Filters of all metal construction, if desired. Morse Filter Valves are manufactured with precision to give long service in continuous duty with minimum wear and maintenance. The valve faces and wearing plates have ground and polished surfaces to have uniform wear and still maintain original efficiency in performance.

Drum Filters 3' to 14' Diameter..... 9 to 700 sq. ft. filter area
Disc Filters 4' to 12' Diameter.....22 to 2200 sq. ft. filter area

★ ***Write and Describe Your Problem . . . Recommendations Promptly Submitted***

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LETOURNEAU ANGLEDOZER STRIPS TIN

85% CHEAPER THAN COOLIE LABOR

When the Ban Hock Hin Mining Company began stripping overburden with this LeTourneau Angledozer and "Caterpillar" D4 tractor on its Malayan tin property, near Kuala Lumpur, cost per yard was reduced 85% below former coolie hand labor methods in the first four weeks of 'Dozer operation. The 'Dozer strips the tough clay topsoil, then feeds the tin-bearing material to electric shovels, where it is loaded into railway cars.

Carryall Doubles Tractor Usefulness

LeTourneau 'Dozer operation has proved so profitable that Ban Hock Hin Mining Company bought a LeTourneau 4-yard Model X Carryall to maintain this low-cost production on the longer hauls. The Carryall digs, hauls and dumps in one continuous operating cycle, is operated by cable from the same LeTourneau two-drum Power Control Unit and D4 tractor as used for 'Dozing. Both tools are quickly and easily interchangeable, thereby provide an efficient means of handling short haul 'Dozing and longer haul Carryall operation with the same tractor. You save on equipment investment and labor.

Solves Labor Shortage

Thus, the combination of versatile 'Dozer - Carryall - tractor with shovel operation has increased tin output to help meet today's ever-increasing demands for this strategic metal. In addition to lowering handling costs and increasing production, the 'Dozer and Carryall have also profitably solved a current labor shortage problem in Malaya.

Many Uses on Many Properties

Like Ban Hock Hin, many other outstanding mining companies are using LeTourneau equipment in the Far East. To mention a few in Malaya: Anglo-Oriental Malaya Ltd., (tin), Pacific Tin Corporation and Malayan Collieries Ltd., (coal). In the Philippines, Masbate Consolidated Mining Company and the Acoje Mining Company, both gold mining properties, use this modern LeTourneau method. Scores of other successful mining outfits the world over use LeTourneau equipment to clear land, strip overburden, build roads and dikes, haul ore, move tailings, dig feeder ditches and dredge ponds, etc. Here's a low-cost answer to your mining and materials-handling problem: See your LeTourneau-"Caterpillar" dealer TODAY!

Modern-minded Ban Hock Hin Mining Company is the first Chinese open-pit mining outfit in Malaya to use tractor equipment . . . found this LeTourneau 'Dozer rig a profitable investment.

CABLE ADDRESS: "BOBLETORNO"

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

CARRYALL* SCRAPERS, ANGELDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, TRACTOR CRANES, PUSHDOZERS, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNATRAILERS*, TOURNACRANES.

*Name Reg. U. S. Pat. Off.

Vestinghouse ASL Transformers — Eliminate Fireproof Vaults

Three 150-kv-a, 2400-volt, type ASL, air-cooled transformers installed at the end of an abandoned drift by the Idaho-Maryland Mines Corp., Grass Valley, Cal. No fireproof vault or liquid catch basin are required. Installation time and cost were reduced to simply moving in the transformers and setting them up.

The pictures tell the story. No fireproof vaults or liquid catch basins are needed with Westinghouse ASL Transformers. You can install them in any properly ventilated drift or entry (subject to state regulations) and know they're safe. They present no hazard to workers or mine.

Insulating materials are air, porcelain, asbestos, mica and glass.

ASL transformers contain no liquid. Consequently, danger of explosion from this source is entirely eliminated.

Compact and light in weight ASL transformers are easy to transport underground, easy to install and provide greater flexibility for mine applications. State authorities, in many cases, have approved them for underground installation as a device which contributes to the over-all safety of mines. Buy Westinghouse ASL Transformers for safety, convenience and reduced installation costs.

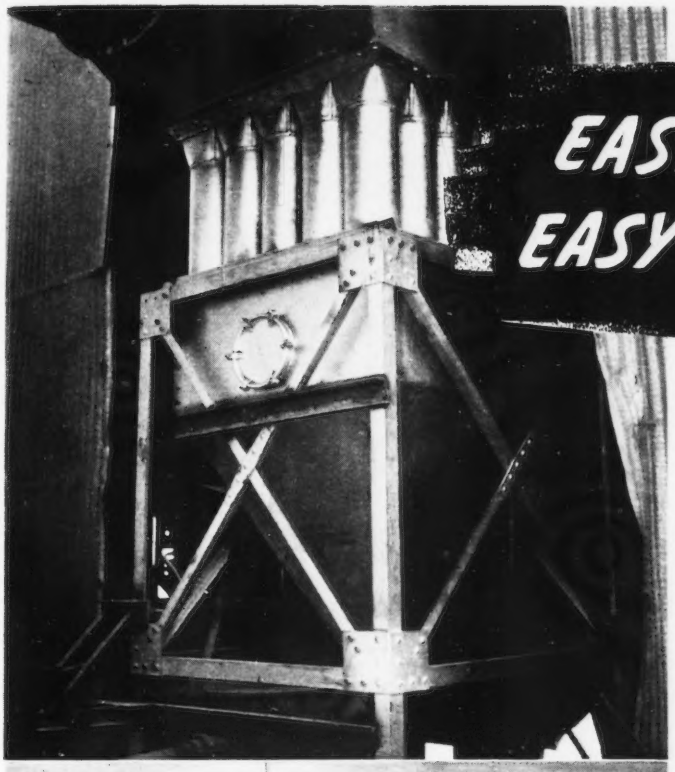
For further information, write for folder F-8643 or call our nearest local office. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

More proof that ASL transformers are easy to install. This view showing the switchboard in front of the three units illustrated above, clearly indicates that the entire installation is in open air. Note the mine timbers. No special construction or extra safety precautions were necessary.

J-94480

Westinghouse

AIR-COOLED TRANSFORMERS



EASY TO ERECT
EASY TO INSPECT

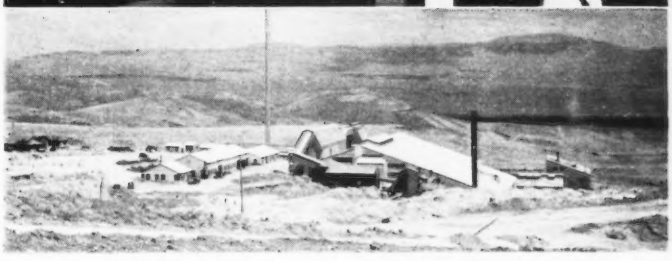
MULTICLONE Dust Collectors are compact and may be located in otherwise useless space, yet afford high operating efficiencies. The illustration shows a MULTICLONE fitted into a restricted space in an existing structure at Getchel Mine, Inc., Winnemucca, Nevada.

They have a common inlet and outlet which simplifies the flue system and makes a neater and more economical installation.

A common dust discharge simplifies the handling of the collected material.

MULTICLONES are all metal and consequently fireproof. They handle hot gases and may be jacketed to conserve heat for use in the plant. Made with lead tubes, they are even recovering acid mist.

These are only a few reasons why MULTICLONES enjoy an outstanding position in the collection of all kinds of dust for the elimination of a nuisance or the recovery of values.



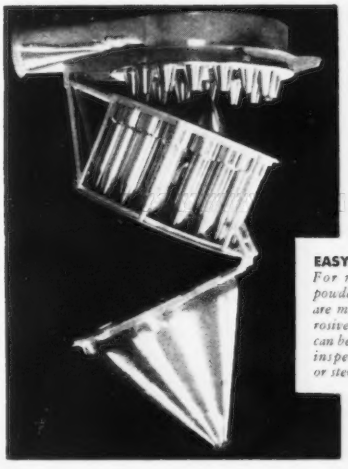
AVAILABLE IN ANY CAPACITY

With unit tube construction, multiple assemblies in parallel provide for any capacity from a few c.f.m. to hundreds of thousands.

A recent installation collects metallic values from six hundred thousand cubic feet of hot gas every minute.

Another installation eliminates the fly ash nuisance from 200,000 c.f.m. of boiler stack gases.

At cement plants, Multiclones collect dust for return to the kilns or to storage.



EASY TO INSPECT
For many process powders, Multiclones are made of non-corrosive materials and can be dismantled for inspection, cleaning or sterilization.

MULTICLONE
MECHANICAL DUST COLLECTION

WESTERN PRECIPATION CORPORATION
1012 West Ninth Street, Los Angeles, California

PRECIPITATION COMPANY OF CANADA, LTD.
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Please send new Bulletin on Multiclone Dust Collectors.

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SETTING THE PACE FOR *ONE-MAN DRIFTER* Performance

SMALLER and lighter than any drifter heretofore available, the Gardner-Denver D-73 is setting the pace for one-man drifter performance. The D-73, a 2¾″ bore machine, weighs but little more than a hand-held drill mounted for drifting—but in drilling speed and power of rotation, it is the equal of most 3″ drifters.

Mining operators report the D-73 is ideal for use in medium ground, in small headings, in remote working places or in locations difficult of access with heavier drills.

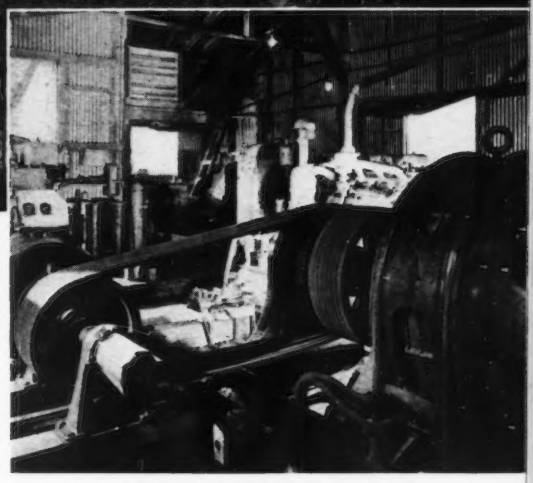
USERS LIKE THESE OUTSTANDING FEATURES OF THE D-73 DRIFTERS:

1. **Ability to rotate in tight or fitchery ground, and to handle long steel due to powerful, four-pawl rifle bar rotation.**
2. **Unrestricted admission of air with an extremely short valve stroke due to the modern, high performance Gardner-Denver "H" valve design.**
3. **Hole cleaning is effectively accomplished by live air at full line pressure.**
4. **Positive lubrication reaches all working parts from a large oil reservoir, through metering pin.**

The D-73 Drifter may be furnished with any of three types of chuck construction. Send today for complete information and specifications. Gardner-Denver Company, Quincy, Ill.

GARDNER-DENVER *Since 1859*

MINE POWER THAT SPEEDS DEFENSE



• "Caterpillar" Diesel Power saves money for the Rip Van Winkle Mining Company's silver, zinc and lead ore-dressing plant at Elko, Nevada.

• Two "Caterpillar" Diesel D13000 Engines run a 185-kw. generator to power electric motors in the Rip Van Winkle Mining Company plant – using only about 4 gallons of 8c fuel each per hour.

In the mining and refining of the metals so urgently needed for America's defense, "Caterpillar" Diesel Power is rendering a vital service. Right now, when every minute and every ounce of production count, "Caterpillar" Diesel Engines and Electric Sets are providing economical, 24-hour-a-day power for every mining and milling need.

They're generating electric energy, driving compressors, powering shovels, locomotives, hoists – performing a hundred different tasks with sure dependability.

Even in isolated locations, far from the power lines, mine operators are able to maintain peak production and hold down costs with "Caterpillar" Diesel Engines and Electric Sets. Burning the cheaper grades of Diesel fuel, such as No. 3 domestic burner oil, they give better than ordinary Diesel economy. They're built with proven "Caterpillar" ruggedness—able to stand up under severe service month after month. And they're backed by the most complete and readily available replacement-parts and service facilities of their kind in the world.

See your "Caterpillar" dealer or write direct to the factory for further information.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

ENGINES AND ELECTRIC SETS • TRACK-TYPE TRACTORS • ROAD MACHINERY

YEAR-END REPORT TO CYANAMID CUSTOMERS

1941 has been a year of unprecedented expansion of mining and milling to feed the furnaces and forges of a metal-hungry world. Despite the pressure for ever-increasing production of metals and non-metallics, the constructive forces of research and engineering have nevertheless made progress that will continue to benefit mankind long after the dislocations of today have been recorded in the history books of tomorrow.

Privileged, through the friendly cooperation of the mining world, to become an important supplier of the tools of mineral beneficiation, it is only proper that Cyanamid render an accounting of its stewardship in this year of unparalleled activity.

★ ★ ★

DURING 1941 Cyanamid continued its long-term program of reagent research. Aerofloat Flotation Reagent 33 — a strong promoter for lead and silver sulphides—was developed and has found application in several mining districts. The field of usefulness of Aerofloat Flotation Reagent 242 was considerably extended in the treatment of gold, silver and lead-zinc ores. Although it is a strong promoter for sulphides, it produces a froth

AMERICAN CYANAMID COMPANY

which is remarkably free from gangue. As an added advantage, its inherent frother characteristics reduce the consumption of auxiliary frothers.

During 1941 Cyanamid added reagent production capacity while maintaining its high standards of quality, so that despite the many uncertainties of chemical raw-materials and transport the mining industry has had an adequate supply of reagents.

In 1941 Level Type Fagergren Flotation Machines were specified or installed by a number of large copper, zinc and non-metallic concentrators. This acceptance of the new Level Type Fagergren resulted from its important advantages of simplified design, greater operating efficiency, reduced operating and installation costs.

And to climax a year of progress, Cyanamid expanded its activities to include Technical and Sales Service throughout the world on Heavy-Media Separation (Sink-Float) Processes, employing both ferrous and non-ferrous media. In these times of urgent demand for both metallics and non-metallics, the addition of Heavy-Media Separation to an existing flow scheme offers a proven, low-cost method of preconcentration of mill feed to produce larger output from existing concentration equipment, or, an economic process for concentrating sub-ores and waste products that have hitherto been too low-grade for treatment. In addition, Heavy-Media Separation may produce savings in mining costs by permitting less selective and lower cost mining methods. Laboratory and mill results indicate that Heavy-Media Separation will have wide applicability in producing directly a marketable concentrate. This should be particularly interesting to producers of strategic non-metallics.

Cyanamid now offers to the entire mining industry the services of its expanded Ore Dressing Laboratory and its Field Engineers to assist in determining the economic application of Heavy-Media Separation (Sink-Float) Processes, as well as chemical beneficiation, to mining and concentration problems.

★ ★ ★

In the year ahead Cyanamid confidently hopes and expects to provide the mining industry with an even better and broader technical service and a reliable source of supply for a comprehensive line of metallurgical chemicals through Cyanamid Field Engineers, the Cyanamid Ore Dressing Laboratory and Cyanamid production facilities.

Cyanamid continues to base its future welfare on the simple policy of always keeping the welfare of the mining industry as the essential purpose of Cyanamid Service to Metallurgy.

30 ROCKEFELLER PLAZA, NEW YORK

Another Stop Around the World with SYMONS CONES

THEY PREDOMINATE IN Africa TOO

In Africa, as in all the world's great metal producing areas, Symons Cones are on the job doing the reduction crushing. Randfontein Estates, Government Areas, East Rand, Springs, West Rand, these all rank among the highest in gold output and they all use Symons Cones. In the production of copper, companies like Roan Antelope, Mufulira, N'Kana, N'Changa, and Minera du Haut Katanga are important names in their field. These five companies alone are using thirty-seven Symons Cones. The many installations engaged in fine reduction work on these and other ores in Africa is just one more proof of the claim that, wherever fine crushing is done in quantity, Symons Cones predominate.

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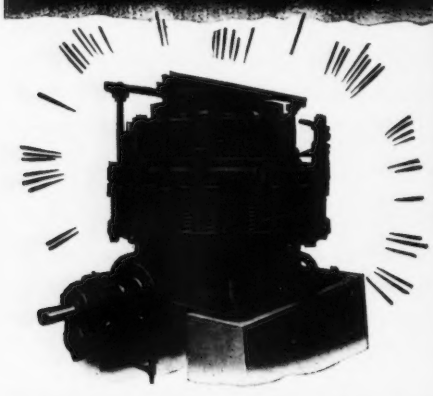
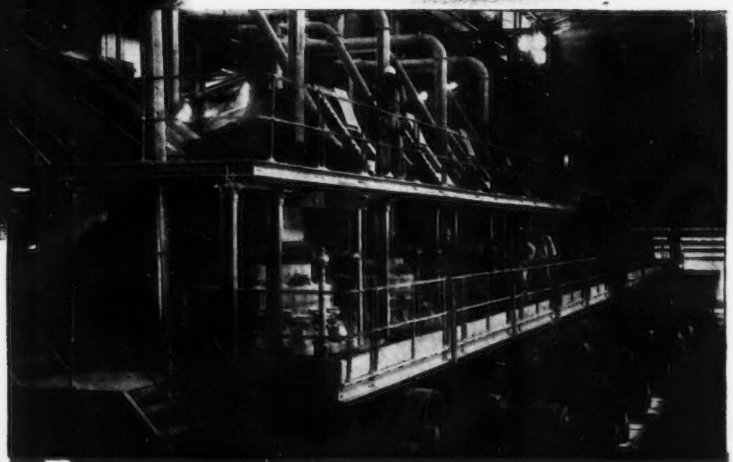


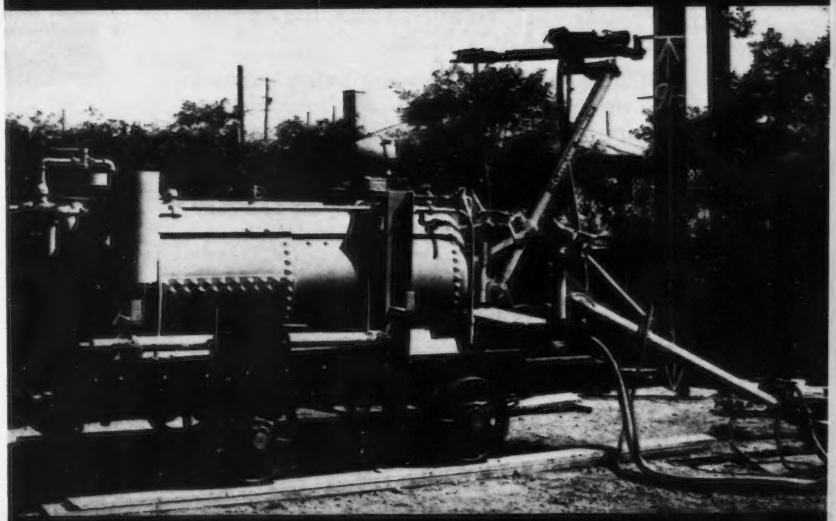


AMONG the various multi-unit Symons Cone Crusher installations in Africa, that at Roan Antelope Copper Mines, Ltd., is particularly outstanding because of the size and number of units. Here there are six Standard and five Short Head Cones, all of the 5½ foot size.

SYMONS CONE CRUSHERS

CLEVELAND JUMBO

The above shows two drifters mounted on the MDR Jumbo, starting a cross-cut.



As one big mining property mounts the MDR. Note the large water tank, two vertical air receivers, and the position of the ceiling jack, alongside the tank, when not in use. One drifter is set to drill 9 ft. above the track level, while the other is positioned for a lifter.

• It's more than a jumbo, in the usually accepted sense of the term. The jumbo you have used is a maze of columns and arms, generally built by the mine or tunnel contractor, and it did an efficient job for you. But compare it with this Cleveland Jumbo, with its two or three extremely flexible and adaptable booms, each supplied with a low-center arm and saddle on which you can place one of those fast Cleveland D24, D12, or D14 Drifters. You mount it on your own mine car, arrange it to suit your particular drilling round, provide a water tank and steel rack, if desirable. You will like the safety and speed of setting up the drill. No columns to set, no arms to place, and the drifters don't have to be lifted to position, as in the old way. When the machine is run up to the face, you secure two ceiling jacks, and the Cleveland Jumbo is ready for action. It's easy to spot the holes, and quick to drill them, to exact angle and position. Better drilled holes give you more breakage of rock for your round. From one track position, you can drill to 9 feet roof height, twenty-eight feet in width. Literature sent on request.

•

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MARCY MILLS

CAN HELP YOU TO MEET UNCLE SAM'S NEEDS FOR STRATEGIC METALS

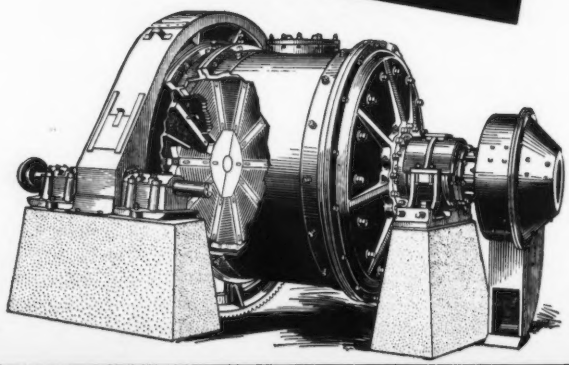
Great expansion of metal production is being facilitated by favorable priorities to operators of the nation's ore milling plants. "Mine & Smelter" is bending every effort to take advantage of that cooperative attitude—particularly in building and delivering MARCY Mills.

Millions of tons of ore are being ground in *new* MARCY Mills. Millions of tons more will soon be added. When you place an order for one or many MARCY Mills you can be assured that no stone will be left unturned to give you delivery on the promised date.

Confidence in the superior performance of modern MARCY Open-End, Low-Discharge Mills is evidenced in recent large purchases by many of the industry's largest operations.

Your inquiries will be given the prompt attention of our experienced staff.

Other "MINE and SMELTER" Products
Genuine Wilfley Tables; Rock Bit Grinders; Density Controllers; Amalgamators; Belt Feeders; Rubber Pinch Valves; LABORATORY EQUIPMENT; MINE AND MILL SUPPLIES; COMPLETE MILLING PLANTS



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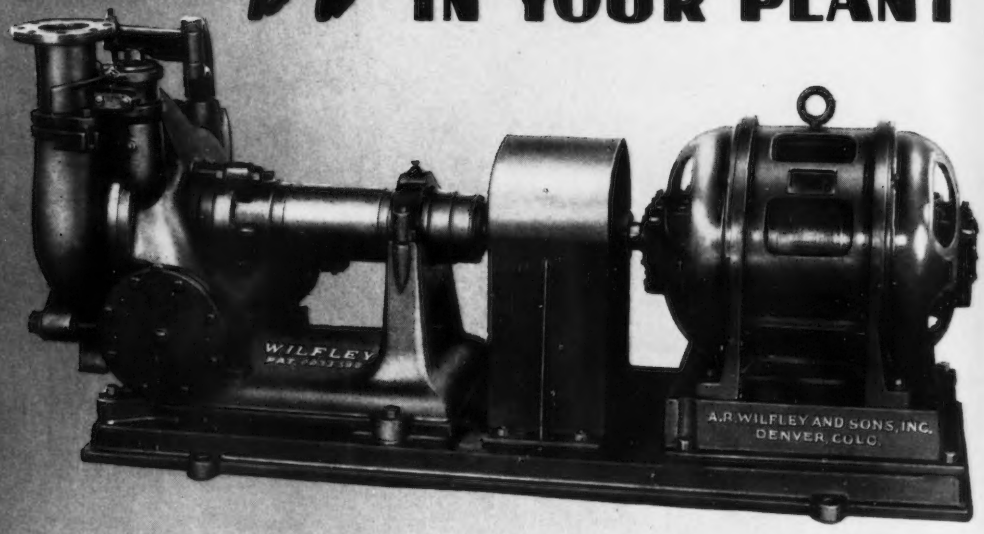

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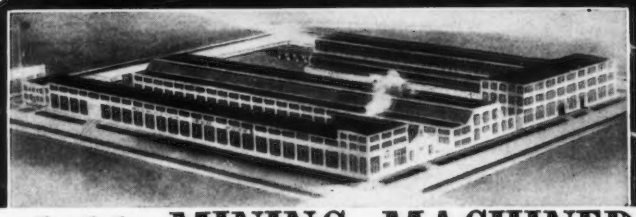

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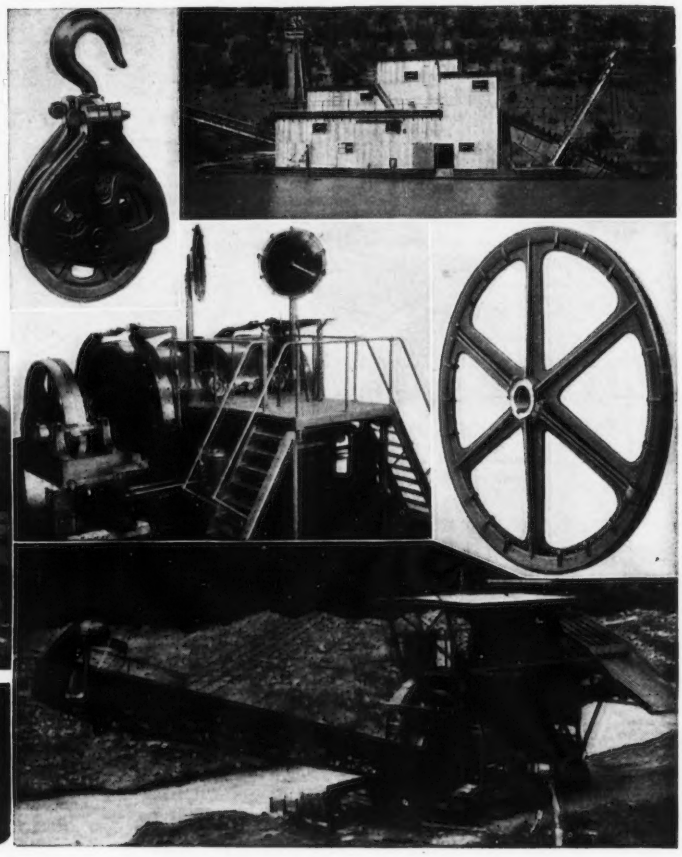

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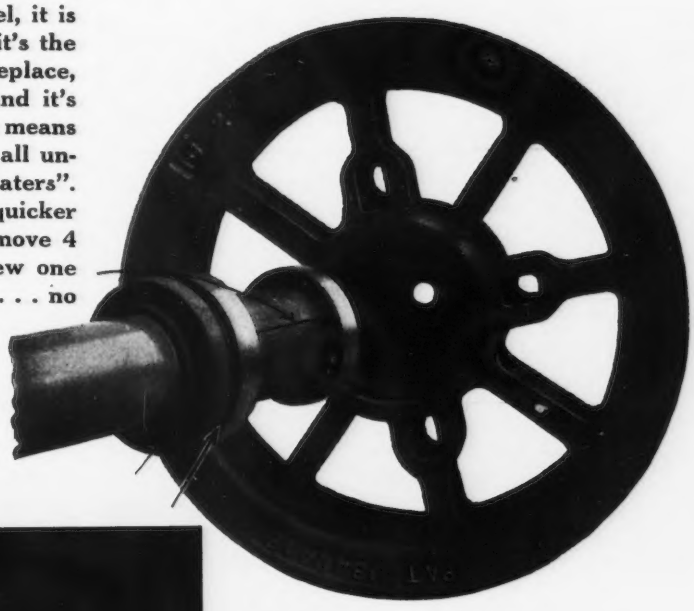
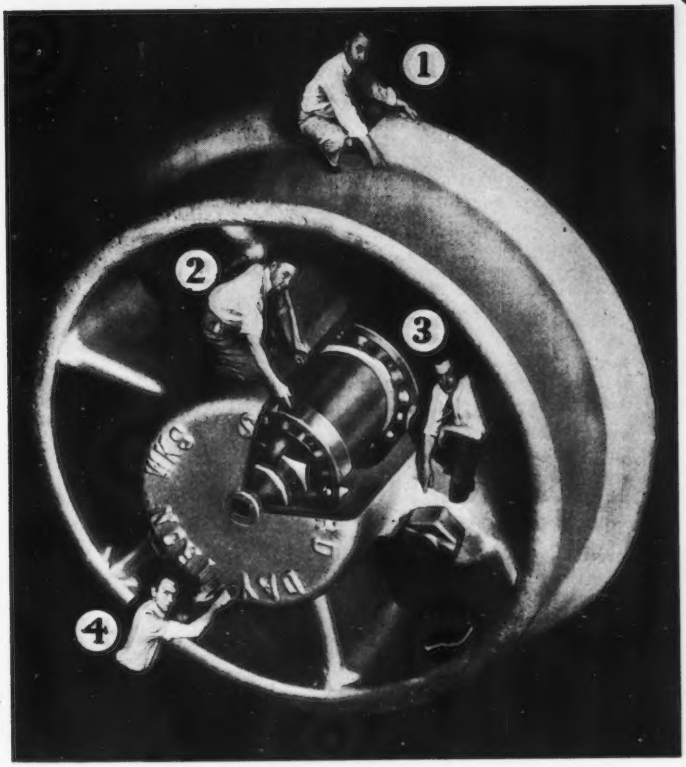
. . . you can change it quicker than smoking a cigarette—

Now, more than ever before, time is money in mining. Dare-devil drivers on the track at Indianapolis know that first place money may be won or lost by the speed of changing a wheel. And, hundreds of mine operators know that the DEMOUNTABILITY of S-D "Floater" wheels means saving cold cash, particularly in an emergency. When something happens to cause a broken wheel, it is always when least expected. And if it's the type of wheel that takes hours to replace, men, machines and money are idle and it's costing plenty. Throwing the car out means more loss of time and money and it's all unnecessary, when you are using "Floaters". S-D "Floater" wheels can be changed quicker than you can smoke a cigarette. Remove 4 nuts, replace the old wheel with a new one and you're through. No adjustments . . . no monkeying around with bearings, because "Floater" Bearings remain on axle, as shown at right, in perfect adjustment and, no pinching is possible when wheel is replaced.





BUT THAT ISN'T ALL —

Power savings alone will pay you handsome dividends. In a recent independent engineers test of S-D "Floater" ball bearing wheels versus wheels with other types of precision bearings, "Floaters" show a cash saving of $5.51 in electric energy per car per year. The effective haulage capacity of the locomotive was 49.5% greater when pulling cars equipped with "Floater" wheels. Write for the complete test story, printed in detail.

Other important features of "Floaters" are illustrated at left. 1—Deep chilled treads . . . true shape . . . with Sanford-Day's Patented Annealing process. 2—The S-D "Floater" Bearing . . . permits automatic adjustment of bearings. 3—Demountable, like automobile wheels. By removing lock nuts, wheel may be slipped off axle, while bearings remain in place. 4—Solid closed hub . . . no loose caps . . . no projecting axles . . . no grease leakage.

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E.&M.J. Dec.,'41

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↑ **FIRST TWO OF THREE** engines comprising the complete installation. Note the height of the ceiling and travelling crane which permit quick and efficient maintenance. These engines are CP heavy duty RHB models, characterized by long, low-cost service — one of a family of 23 sizes, ranging from 3 to 8 cylinders, 60 to 1000 h.p.

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Total Horsepower 2625

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Chicago Pneumatic Tool Company, builder of all three Diesel engines, was general contractor on the complete project — engines, equipment and building.

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↑ **METAL INSTRUMENT BOARD,** typical of the design and character of construction of this ideal Diesel plant. Provides one-man, finger-tip control of power distribution throughout the plant.

←**WATER SOFTENER** installed by Chicago Pneumatic as part of design and construction. With thirty years of oil engine experience, CP is equipped to design complete Diesel plants to meet specific needs.

↑ **THREE HEAVY DUTY** 875 h.p. CP Diesel engines, four cylinder, direct injection type, are housed in this modern building, erected in record time for an urgently needed defense project by Chicago Pneumatic Tool Company.

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60 to 1000 h.p.
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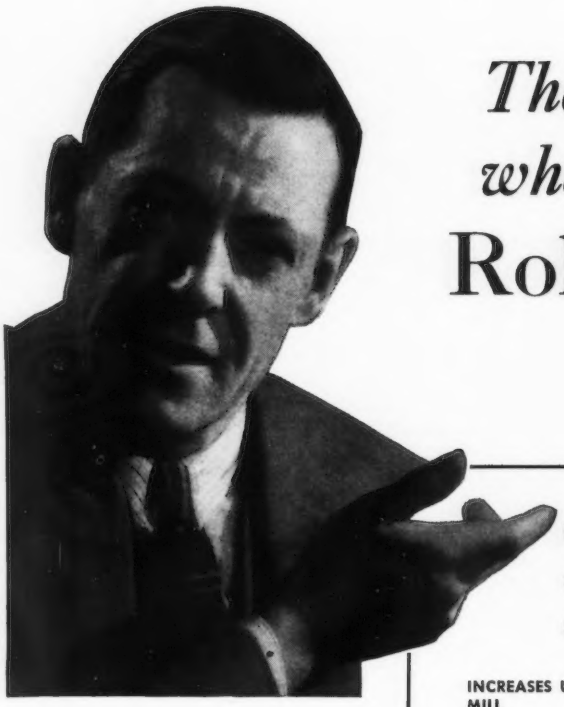

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—because the greater strength of the high carbon steel permits the use of a plate of reduced thickness. This gives increased output or greater fineness of grind.

INCREASES THE LIFE OF THE LINING
—because rolled steel is tougher, will not crack or fracture even when worn thin, and remains usable beyond any possible limit obtainable with ordinary cast steel linings.

ELIMINATES ROCKING OF LIFTING BARS
—for Lorain Lifting Bars not only wedge between the liner plates, but clamp over them.

ELIMINATES SCRUBBING ACTION
—because the lifting bars not only hold the plates firmly in place allowing no material to lodge between the liner and the mill shell, but they are designed so that they never touch the mill shell.

LIFTING BARS ARE REVERSIBLE
—and a complete renewal of the cascade angle can be obtained by reversing them when one edge is worn.

LIFTING BARS ARE RENEWABLE
—when both edges are worn they may be replaced without removing or renewing the liner plates. This means the replacement of only a third of the total weight of the lining to get a completely new cascade angle.

PLATES ARE SYMMETRICAL
—thus can be either moved or reversed to compensate for excessive wear. This adds to the life of the lining and reduces costs.

BARS AND PLATES ARE EASILY INSTALLED
—for they are lighter in weight than cast sections, and their easily handled, interchangeable sections result in less man-hours of labor and loss of mill operating time.

LIFTING BARS ARE READILY OBTAINABLE
—because their unique design makes only two types necessary—light and heavy. The only work required is cutting to length and boring the necessary holes.

CUT your grinding costs. Get rid of your output and maintenance losses. Increase your grinding efficiency. You can do it with U·S·S Lorain Rolled Steel Plate Lining. Mills all over the country have been doing it ever since its introduction in 1935. Today, it is giving a remarkable performance grinding lead ores in Tri-State Chert, gold in quartzite, coke breeze, mixtures of ores for chemicals, magnesite, cement rock and cement clinker. It is widely used for both wet and dry grinding in ball, rod, tube and compartment tube mills.

Lorain Rolled Steel Plate Lining is adaptable to any type of mill—in any diameter or length. It is available in whatever thickness best suits your grinding conditions.

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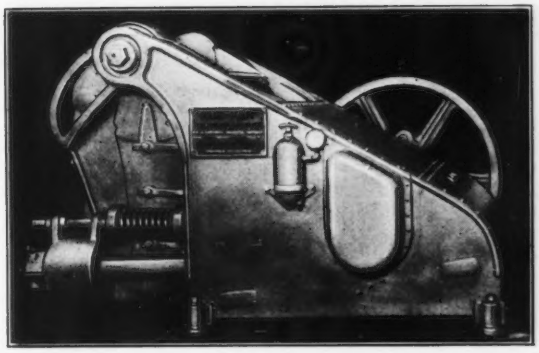

You can increase mill capacity . . . improve recoveries . . . and cut your costs by providing a finer mill feed. A Kue-Ken Crusher will accomplish all this for you as it has for many other mine owners. One man actually doubled mill capacity this economical way.

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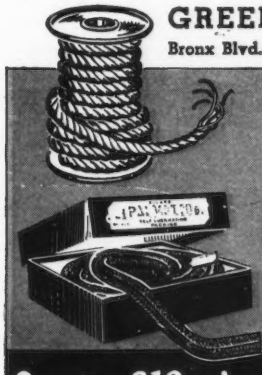

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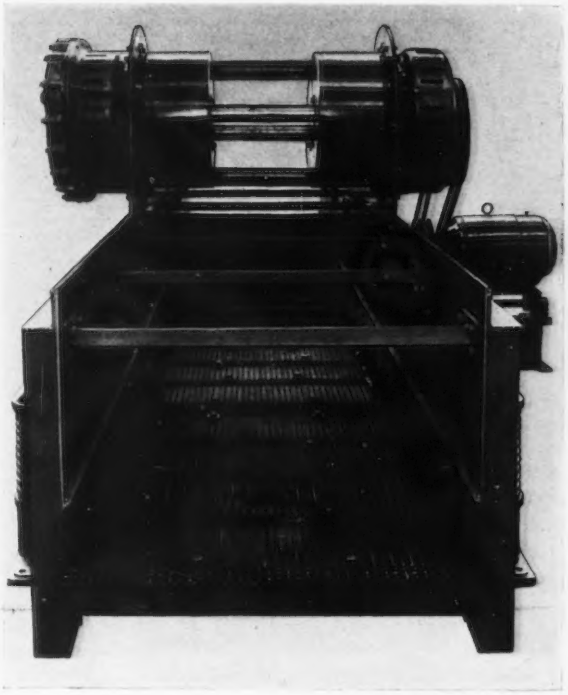

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NEW YORK ENGINEERING COMPANY
75 West St., N. Y. City, U. S. A. Cable Address, NYECO, N.Y.

BARRETT NO. 4 OIL
BARRETT NO. 634 OIL
CRESYLIC ACID

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK, N. Y.

Barrett
FLOTATION OILS

MAN-power . . . "MP"

It takes MAN-power to make modern organization and equipment effective. If you need MAN-power in your organization you can locate the best man, or men available, through a Positions Vacant advertisement in the

Searchlight Section—
ENGINEERING and MINING JOURNAL

G.N.S. No. 5 PINE OIL

LONG THE STANDARD FROTHING OIL

For Flotation

NEWPORT INDUSTRIES, Inc.
230 Park Avenue New York, N.Y.

MACKLIN
GRINDING WHEELS

Macklin Wheels Are Uniform

Uniformity in grinding wheels must begin with the first manufacturing operation. Extra precautions are taken to insure absolute accuracy in mixing the specified abrasives and bonds to predetermined standards and formulas. Ingredients are carefully weighed to exact proportions in air conditioned and humidity controlled departments. These modern methods enable Macklin to *Protect Your Production* by producing uniform and scientifically controlled grinding wheels.

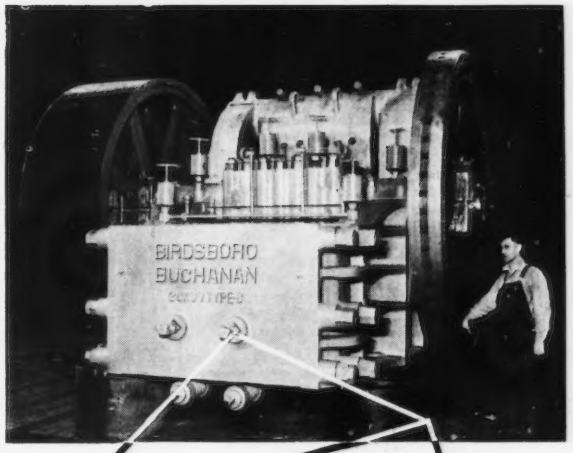
Ask for Macklin engineering service.

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices — Chicago — New York — Detroit — Pittsburgh — Cleveland — Cincinnati — Milwaukee — Philadelphia



WANTED

MORE OPPORTUNITIES TO MEET UNUSUAL CRUSHING PROBLEMS

This problem was mined asbestos rock reduction. An output of 300 tons per hour to 4" size was required from the primary crusher. Complicated operating conditions and the type of rock involved made it clear that a specially designed deep frame crusher would be needed.

The experience and the ability of Birdsboro's engineers to grasp and quickly solve unusual crushing problems enabled us to present a workable solution in a very short time, and the illustrated special 36" x 60" Birdsboro-Buchanan All Steel Crusher was built.

This is the type of job we like to do. We have the plant, the equipment, and the men with experience to do it, which enables us to keep costs within reason.

So if you are faced with one of these unusual crushing problems, no matter what the capacity requirements are, let us shoulder the burden. Just jot down the details and send them along.

PLANTS AT BIRDSBORO and READING, PA.

BIRDSBORO - BUCHANAN

CRUSHERS

Canadian Representative:
Fraser and Chalmers, Ltd., G. E. Sancton, Mgr., Montreal, Canada

AIR COMPRESSORS:
(7) Steam 46 ft., 66 ft., 300 ft., 600 & 1000 ft.
(12) Belted, 360, 676, 870, 1300 ft.
(6) Electric, 1300, 1500, 1722, 2600, 5000 ft.
(14) Gasoline, 110, 160, 220, 310 & 370 ft.
6 Diesel 105, 315, 420, 603, 1000 & 1500 ft.

HYDRALUIC CARWHEEL PRESSES:
100 Ton, 150 Ton, 200 Ton, 300 & 400 Ton Caldwell-Niles-Wood-Watson Stillman

STORAGE BATTERY LOCOMOTIVES:
3—3 ton Whitcomb, 24 Ga.
6—5 ton Whitcomb & Mancha, 30 Ga.
4—4 ton Goodman, 36 Ga.
3—5 ton G.E., 36 Ga.
4—5 ton Mancha 36 Ga.
4—6 ton Goodman 36 Ga.
5—8 ton Baldwin-Westgh., 36 Ga.
4—13 ton G.E., 36 Ga.
6—Goodman 10 ton, 36 Ga.

TROLLEY LOCOMOTIVES:
2½ ton Westinghouse 24 Ga.
3—3 ton & 2—4 ton Goodman 36 Ga.
5—6 ton Baldwin-Westgh., 36 Ga. Comb.
4—6 ton Goodman 42 Ga. & 3 Goodman 36 Ga.
3—8 ton Goodman 36 Ga.
4—6 ton Baldwin-Westgh., 42 Ga.
3—9 ton & 10 ton G.E., 42 Ga.

RUBBER CONVEYOR BELTS:
1000' 60", 600' 30", 300' 20", 1600' 42", 500' 40", 1450' 36", 1200' 24", 900' 18", 600' 16", 350' 14"

CONVEYOR PARTS:
Idlers, Head & Tail Pulleys, Steel Frames, Tripper, etc., 14 in., 60 in. Large Stock in Jersey

SYNC. MOTOR GENERATORS:
5-15-25-40 kw. Battery Chargers
5—50 KW 1800 RPM 3/60/440-120 V
100 KW Westgh. 900 RPM 3/60/2200-250-275
100 KW Ridgway 1200 RPM 3/60/2200-250-275
150 KW G.E. 1200 RPM 3/60/2200-250-275
200 Ridgway 900 RPM 3/60/2200-250-275

TUGGER HOISTS:
30 Ingersoll Rand Electric DD, 7½ HP, 15 HP, 20 HP, 35 HP & 45 HP
6 Ingersoll Rand SD Air Tuggers

DRIFTER DRILLS:
75 Worthington 169 & 180, Ingersoll Rand X71 & S70 Gardner Denver 89B, 25—IRDA 35

PUMPS
25—IR size 25 Air
7—IR 2½—25 HP Motor pumps
6—CP, CP7 Port Sludge
105 High Head Elec. 50 to 500 HP

ROTARY KILNS
5'x24', 7'x40', 6'x60', 7'6"x125', 8'x160'

ROTARY DRYERS. Direct Heat
Double Shell: 5'x26', 5'x30', 5'6"x60', 80"x45'
Single Shell: 5'x30', 6x40, 6x50, 6x60, 7x60, 8x120
Indirect Heat: 2—4'x20', 5x30, 6x40

MACHINERY:
2', 5', 7', Symons Cone Crushers
36x20' Diamond Crushing Rolls
120 Flat & Dump Cars, 1 to 5 ton
Model 20A, 30 A & 50 & 60 Conway Muckers
Model 21 Findley Elmco Loader
GD 9 Gardner Denver Loader
5—Tyler Hummer Vibrating Screens, 4x5 & 4x8
Sullivan Loading Slide with Sullivan Hoist
Ball Mills: 3'x30", 7'x22" & 8'x10'
Jaw Crushers: 9x16, 6x20, 10x20, 11x20, 10x30, 18x36, 15x36, 24x36, 28x36, 24x48, 36x48, 42x48, 48x60, 66x86, 30x18, 7x10, 6x20
6—Kennedy 19, 25, 37 & 49 Crushers
7—I.R.—40, 50 & 52 Sharpeners
4—Gardner D86 Drill Sharpeners
7½, 15, 20 & 30 KW Battery Chargers
560 HP F M. Diesel Engine
5 Caterpillar Gas Draglines, 1 yd to 3 yd, 40 to 97 ft. booms

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.
Cable Address New York: Stanequip

USED MACHINERY AT A SAVINGS

AIR COMPRESSORS
1—14 & 7½x12 I.R. Imp. Type 10, 2 Stage B.D. Air Compressor 447 Cu. Ft. Displacement, with 60 H.P. Motor.
1—16 & 9 x 12 I. R. Imp. Type 10, 2 Stage B.D. Air Compressor with 100 H.P. Motor.

BOILERS
2—250 H.P. Marine Type Boilers, 250# Pressure, Complete with Fittings, Stokers, etc.
1—150 H.P. Tubular Boiler 125# Pressure.

BALL MILLS
1—64½ Marcy Ball Mill with 100 H.P. Slip-Ring Motor.

CLASSIFIERS
1—45" Akins Classifier-High Weir.

CRUSHERS
1—15x24 Universal Jaw Crusher.
1—24"x24" Jeffery Single Roll Coal Crusher.

FILTERS
1—6'—2 Disc American Filter with vacuum equipment.

HOISTS
5 H.P. to 100 H.P. Complete with Motors (all late type)

SYNCHRONOUS MOTORS
1—100 H.P. West., 3 Ph., 60 Cy., 2300 volts. 900 RPM, with Exciter, etc.
1—700 H.P. Gen. Elec., 3 Ph., 60 Cy., 2300 volts, 720 RPM, with Exciter, etc.

MISCELLANEOUS
1—36" Vezin Sampler.
1—3'x6' Telsmith Self-contained vib. Screen.
1—10'x8' Thickener with Mech.
1—12'x8' Thickener with Mech.
1—6 Cell Denver Sub-A Flot Machine
1—3" Wilfley Sand Pump.
1—6'x6' Deveroux Conditioner.
15000'—5/8" 6x7 Wire Rope.
3300'—1¼" 6x7 Wire Rope.

Write or Wire us your requirements as we have a complete stock of Motors, Transformers, Rails, Pipe, etc. Write for Catalogue

FLORENCE MACHINERY & SUPPLY COMPANY

P. O. Box 94 **Florence, Colorado**

GOOD USED EQUIPMENT

ROD MILL

1—6'x12' **HARDINGE ROD MILL,** straight side, iron lined, herringbone steel gears, enclosed gear drive units; charge of rods with mill. Arranged for peripheral or trunnion discharge. In excellent condition and for immediate shipment.

ROTARY KILNS

5'x24', 7'x40', 6'x60', 7'6"x125'.

ROTARY DRYERS, direct heat

Ruggles-Coles, double shell: 5'x26', 5'x30', 5'6x60', 80"x45'.
Single Shell: 5'x30', 6x40, 6x50, 6x60, 7x60.
Indirect Heat: 2—4'x20', Class B-2, **Ruggles-Coles.**

HARDINGE CONICAL MILLS

Silex lined: 4'6x16", 5'x22", 6'x22", 6'x48", 8'x18", 8'x30".
Iron lined: 3'x24", with classifier; 4'6x16", 5'x22", 6'x22", 8'x18", 8'x30", 8'x36" with motor; 8'x48" with air classifier; 8'x48".

VIBRATING SCREENS

1—4'x14' **Symons,** Double Deck.
2—4'x7' **Leahy,** 2 deck, motor driven.
4—3'x5' **Tyler Hummer,** 2 deck, No. 31, enclosed.
2—4'x7' **Jeffrey Traylor,** Type FB-4, 2 deck.
1—3'x7' **Simplicity,** 2 deck, motor driven.
1—3'x8', 3'x10' **Niagara,** 3 deck.
1—4'x8' **Huron,** 1 deck, V-belt drive.

CONSOLIDATED PRODUCTS CO., INC.

13-19 Park Row New York, N. Y.
Our Shops at Newark, N. J., cover eight acres.

SPECIALS

55 HP Atlas Imperial diesel engine.
900 CFM Ingersoll steam driven compressor
75 Ton daily capacity cyanide plant.
1 No. 4 Allis-Chalmers gyratory crusher —like new.
1 Gruendler pulverizer.
1 Complete Assay office including Braun pulverizer, Chipmunk crusher.
1 16 Ton gasoline locomotive.
2 50 Ton Shay narrow gauge locomotives
1 Osgood ¾ yd. gasoline crawler type combination shovel and dragline.
Rails — cars — locomotives.
Mining & Milling Equipment.

HYMAN-MICHAELS COMPANY

United Commercial Co. Div.
2200 JERROLD AVENUE
SAN FRANCISCO

750,000 C.M.
POWER CABLE
VERY GOOD CONDITION

Water proof
(Suitable for marine uses)
One Piece—843 Ft.
3 phase—with Lug Connections

Write—Wire—Phone
DULIEN STEEL PRODUCTS, Inc.
11611 So. Alameda Tel: Kimball 9151
Los Angeles, Calif.
SEATTLE • PORTLAND • SAN FRANCISCO

DRIFTER DRILLS

Ingersoll-Rand N72 and N75 Drifter Drills in good condition at bargain prices.

Complete Machinery & Equipment Co., Inc.
36-40 Eleventh St., Long Island City, N. Y.

NEW and REBUILT
STORAGE BATTERY
LOCOMOTIVES

1½ to 10 Ton—18" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Penna.

DIESEL ELECTRIC PLANT

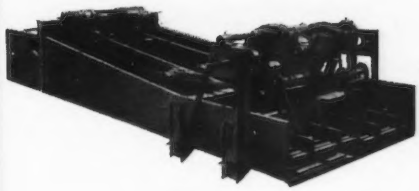
With Auxiliary Equipment—Ready to Operate

1120 H.P. IN TWO FAIRBANKS-MORSE UNITS FULL DIESEL — MODEL 33 STYLE M. DIRECT CONNECTED TO 760 KW 2400 OR 600 VOLTS A.C. GENERATORS

Pedro J. Smith, Inc. **100 East 42nd St., New York City**

(Additional For Sale Advertising Continued on pages 113 & 114)

MINING—MILLING—INDUSTRIAL & ELECTRICAL EQUIPMENT



CLASSIFIERS
1—54"x16' Model "C" Duplex
1—30"x14' Drag Classifier
1—60"x20' Duplex Rake

BALANCES
1—Ainsworth, Assay—1/200 Mg. Sen.
1—Ainsworth, Assay—1/50 Mg. Sen.
1—Troemner, Assay 1/50 Mg. Sen.
1—Troemner, Assay 1/300 Mg. Sen.
1—Thompson, Assay 1/500 Mg. Sen.

GENERATORS
1—37½ KVA. 3/60/110
1—50 KW. 1/60/2200
1—150 KVA. 3/60/2200

WATER WHEELS
1—20" Leffel Style 23 Double Discharge
1—24" Tutthill, C. I. Housing
1—36" Tutthill, C. I. Housing
3—38" Leffel Cascade Water Wheels
1—42" Pelton, Divided Buckets
1—60" Pelton, Divided Buckets
1—60" De Remer, Double Water Wheel
1—72" Pelton, Divided Buckets

LAB. FLOTATION CELLS
1—"Denver" 2000 Gram C.I.
1—"Denver" 2000 Gram
1—"Kraut" 500 to 1000 Gram
1—"Weinig", Timken Bearings, 2000 Gram
1—"Morse" Cast Iron 2000 Gram
1—Standard Lab. Flot. Cell

ORE CARS
29—24" Gauge, Side Dump
4—26 Cu. Ft. Side Dump, Self Dumping
28—1½ Yd. Peteler Two Way Dump
1—Automatic Tilting, Side Dump, 42 Cu. Ft.
2—Automatic Tilting, Side Dump, 80 Cu. Ft.
1—13 Cu. Ft. Ore Car S.H.
28—Side Dump, 50 Cu. Ft.

PRESS FILTER
1—32"x32" Smith Vaile, wash. type
2—34"x34" Merrill, sq. frames
1—18" round pattern
1—18"x18" Perrin
1—42"x42" Merrill, classifying
1—450 sq. ft. Kelley

BATTERY LOCOMOTIVES
2—3½ Ton Atlas Type "B"
3—4 Ton Atlas Type "A"
2—5 Ton General Electric
3—6 Ton Goodman Class "D"
2—7 Ton Mancha Type Hercules
1—5 Ton Mancha Whippet "X"

TROLLEY LOCOMOTIVES
11—3-Ton Jeffrey, cast steel frames
5—3½-Ton Jeffrey, cast steel frames
1—3½-Ton Baldwin—2 motors
1—4-Ton G.E., M.P.H. 6.5
15—6-Ton Jeffrey—armor plate
3—6-Ton Goodman—class O, combination
4—6¼-Ton G.E., 36" gauge

CRUSHING ROLLS
1—12"x6" Davis
1—Triplex 9"x3" housing and feed hopper
1—Triplex 7"x3" housing and feed hopper
1—20"x12" Dewco Convertible type
4—27"x14" F.M. Davis Standard
1—30"x14" Traylor type "A"
2—36"x16" Davis Standard
2—36"x16" McFarlane Rolls
1—36"x16" Dewco Convertible
5—40"x16" Colo. Iron Works
2—42"x14" Allis-Crushing Rolls
1—42"x16" Davis Std.
1—72"x20" Garfield Allis-Chal.

CONCENTRATING TABLES
8—No. 11-D Wilfleys, enclosed heads
8—No. 6 Wilfleys, enclosed heads
8—Deister diagonal deck tables
4—No. 3 Deister slime tables
38—L.H. Deister-Plat-O, encl. heads
33—R.H. Deister-Plat-O, encl. heads

PULVERIZERS
1—Williams Hammer Type Size 3
1—Williams Jumbo Jr. Hammer Type
1—McCool Disc, Style F, Size 14
1—Steadman No. 40
1—Steadman No. 30
1—Foos No. 16 Scientific
1—Power Driven Mortar & Pestle Type
1—Bauer Bros. Co. 24"
1—Raymond Roller Mill 50"
1—Williams Hammer Mill, Size #D
1—Williams Hammer Mill, Size #O

MELTING FURNACES
1—Monarch, Tilting Type No. 100
1—No. 60 Non-Tilting Type
1—Standard Tilt. Type Crucible
1—Morse Tilt. Type No. 150

REDWOOD TANKS—ALL SIZES

ROTARY BLOWERS
1—8x20" Connersville, general purpose
1—6½x22¾" Roots, low pressure
1—8½x29¾" Roots, low pressure
1—12x39" Roots, low pressure
1—18x54" Connersville, positive pressure
1—20x44" Sturtevant, positive pressure
1—26x53" Wilbrahm-Green
1—24x78" Roots, low pressure

DRUM FILTERS
1—Colo. Iron Works 6'x2½'
1—"Portland" 6x4'
1—"Oliver" 8x6'

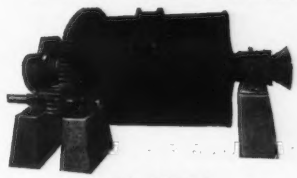
DIESEL ENGINES
1—15 HP. General Motors, 1 cyl., 2 cycle
4—25 H.P. Fairbanks-Morse 1 cyl., 2 cy.
1—25 H.P. Worthington, 1 cyl., 2 cycle
1—90 H.P. Buda, 4 cylinder
1—90 H.P. Caterpillar, 4 cylinder

WELDING MACHINES
2—300 amp. Lincoln "Stablearc" a.c. mot.
1—300-375 amp. U.S.L. Portable, gas engine
2—400 amp. Smithweld, gas engine drive
1—500 amp. Holtzer-Cabot, a.c. motor
4—600 amp. Smithweld, gas engine drive

DRILL SHARPENERS
1—Sullivan, Class "A", Punching Attach.
2—Ingersoll-Rand, IR 50
2—Gardner-Denver, DSB
1—Leyner I. R. Model 5

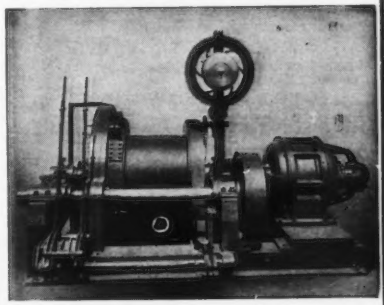
BULLETIN NO. 4101E
COMPLETE LIST OF RECONDITIONED MACHINERY IN STOCK

JAW CRUSHERS
1—8"x7" Baker, Steel Frame
1—5"x12" Sturtevant, Mn. St. Jaws
2—7"x10" Blake, Sect. Frame
1—7½"x11" Samson, Heavy Duty
2—9"x15" McFarlane, New Jaws
1—12"x24" Allis-Chalmers
1—24"x13" Farrel, Blake
2—15"x24" Allis-Chalmers
2—8"x8" Universals
1—9"x14" Universal, No. 3
1—8"x24" Universal, St. Frame
1—13"x24" Telsmith-Wheeling
1—14"x36" Cedar Rapids
1—9"x21" Telsmith R. Bearings



BALL MILLS
2—3'x3½' Morse Std.
1—5'x4' Std. Continuous
1—4'x3' High Pulp Discharge
1—2½'x1½' D.E. Cont. Ball Mill
1—3x2½' Std. Ball Mill
1—5'x7' Chalmers Tube Mill
1—5'x12' Dewco Rod Mill, new liners
2—5'x16' Colo. Iron Wks. Tube Mill
5—5'6"x22' "Schmidt" Tube Mill
1—7'x6' Allis-Chalmers Ball Mill
2—8'x22" Hardinge Type "A"
1—5'x5' C.I.W. Std.
1—5'x8' Std. Ball Mill Continuous
1—7'x6' Std. Ball Mill Continuous

ELECTRIC HOIST
2— 10 H.P. Single Drum, Box
1— 15 H.P. M.B. Single Drum
4— 20 H.P. Vulcan St. Frame Sgl. Drum
1— 25 H.P. "Dewco" Single Drum
1— 30 H.P. Vulcan St. Frame Sgl. Drum
1— 35 H.P. Wash. I. Wks., S. D. Sect. Frame
2— 50 H.P. Leyner—Sectionalized Frame
1— 60 H.P. Vulcan—Steel Base
1— 52 H.P. Vulcan—Double Drum
1— 75 H.P. Leyner—Single Drum C.I. Frame
2—100 H.P. Single Drum—Steel Base
1—100 H.P. Double Drum C.I.
1—150 H.P. Denver—Single Drum
1—200 H.P. Nelsonville—Double Drum
1—250 H.P. Danville Double Drum



ELECTRIC HOIST

1775 BROADWAY NEW YORK CITY

ESTABLISHED 1898

MORSE BROS. MACHINERY CO.

P.O. BOX 1708 DENVER, COLORADO, U.S.A. CABLE "MORSE"

DEPENDABLE RECONDITIONED MACHINERY — MINING ★ ELECTRICAL INDUSTRIAL ★ MILLING

Perret & Brauen, Caixa Postal 3574, Sao Paulo, Brazil, S. A.
Bucchi C. & Cia. Ltda., Casilla 157-D, Santiago, Chile, S. A.
Perrett & Brauen, Caixa Postal 288, Rio De Janeiro, Brazil, S. A.

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UNDISPLAYED RATE:

10 cents a word, minimum charge $2.00.

(See ¶ on Box Numbers.)

POSITIONS WANTED (full or part-time salaried employment only), ½ above rates.

PROPOSALS, 50 cents a line an insertion.

INFORMATION:

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

The advertising rate is $5.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. E.M.J.

NEW ADVERTISEMENTS received by 10 A. M. December 23rd will appear in the January issue (Domestic Edition) subject to space limitations

---

FOR SALE

IMMEDIATE DELIVERY

GENERATOR UNIT

1—18x24 **Chuse Non-releasing Corliss Engine Generator unit, 125/150 lbs. steam, 200 rpm, ≅1350. Direct connected to 200 KW General Electric MPC, 250 volt generator ≅66103. Switchboard panel.**

All in excellent condition.

Located close Terre Haute, Indiana.

Inspection at any time.

INDIANAPOLIS MACHINERY & SUPPLY CO., INC.

1959 South Meridian Street
Indianapolis, Indiana

3—12 Ton 36" Ga. **Whitcomb gas locos.**

2—**4 ton Mancha Bat. Locos.** 24" Ga.

1—**Battery charging set**

17—**40 cu. ft. Dump cars** 24" Ga.

Electric Hoists 50, 100, 150 HP.

Air Compressors 360', 600', 1500'

Eimco Loaders 12B, 20.

Gardner-Denver Loader

2—Model 20A **Conway Muckers**

25 ton Std. Gauge **Gas Locomotive**

J. T. WALSH

508 Brisbane Bldg., Buffalo, N. Y.

LOCOMOTIVES

1—20-Ton **Amer. Loco.**, S/G, Ex. Cond.
2—25-Ton 0-4-0 **Davenport Locomotives**, S. G. EX. COND.
1—25-Ton **Whitcomb Gasoline Loco.**, S/G
1—38-Ton, 0-4-0 **American Loco.** A.S.M.E. Code, S/G.
1—48-Ton 0-6-0 **Baldwin Fireless Loco.** Built 1922. Good condition.
2—60-Ton 0-6-0 **S/T Switching Locos.** Coal-burners. EX. COND.
1—68-Ton, 0-6-0 **Switching Loco.** Excellent condition.

OTHER LOCOMOTIVES, TOO.

IRON & STEEL PRODUCTS INC.

13476 S. Brainard Avenue
CHICAGO (Hegewisch Station), ILLINOIS
"ANYTHING containing IRON or STEEL"

Rotary kilns—4' x 30'—7' x 100'—8' x 125'
Rotary dryers—3' x 30'—4' x 30'—5' x 35'—6' x 40'—8' x 80'.
Tube & Ball mills—4' x 4'—6' x 6'—5' x 22'—5½' x 22'—6' x 22'.
Fuller-Lehigh mills—42"—47" & 52" Bradley mills.
Jaw crushers—From 4" x 6" up to 36" x 48".
Crushing rolls—From 16"x10" up to 72"x20".
Hardinge Mills—4½'—5'—7' & 8'.
Sturtevant rotary fine crushers ≅0-≅1-≅1½ & ≅2.
Sturtevant ring roll mills—≅0-≅1 & ≅2.
12'—15'—16' & 18' **Hereshoff furnaces.**
9' x 15' **Bruckner roaster—Coppercasting machine.**
3' x 4'—8' x 6'—12' x 8' **Oliver filters.**
10' x 14' **air separators.**
Magnetic separators—Jiggs—screens—Classifiers & thickeners.
20", 24", & 25 ton **Allis-Chalmers lead blast furnaces.**
One 2 roll and 3 roll **Raymond Mills.**

New Dryers & Kiln built for all purposes

W. P. HEINEKEN

227 Fulton Street **New York City**

NEW AND USED PIPE

FOR EVERY PURPOSE

Steel Bolted Type Bins

Jos. Greenspon's Son Pipe Corp.

Nat'l Stock Yds. St. Clair Co., Ill.

FOR SALE

DIATOMITE DEPOSIT

Outstanding Oregon Diatomite Deposit. 1120 Acres Patented Mining Claims.

BO-23, Engineering & Mining Journal
68 Post St., San Francisco, Calif.

WE LOOK INTO THE EARTH

By using Diamond Core Drills. We drill for coal and all other minerals. We make test-borings for bridges, dams, etc.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

EMPLOYMENT SERVICE

SALARIED POSITIONS, $2,500 to $25,000. This thoroughly organized advertising service of 32 years' recognized standing and reputation carries on preliminary negotiations for positions of the caliber indicated above, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If your salary has been $2,500 or more, send only name and address for details. R. W. Bixby, Inc., 264 Delward Bldg., Buffalo, N. Y.

POSITION WANTED

MINING ENGINEER, 25 years experience, mining, milling, construction, organization. U. S. Latin America, Orient, Canada. Inured to high altitudes. References. PW-61, Engineering & Mining Journal, 520 N. Michigan Ave., Chicago, Ill.

BUSINESS OPPORTUNITIES

The Engineering and Mining Journal does not accept advertising relating to corporate financing.

Gold Placer

1760 Acres Rich Gold Placer Colorado. Engineers and U. S. Geological Reports Average 44c to $1.75 per yard average. Water now available. Want your best cash offer. H. C. Sprinkle, Durham, North Carolina.

Amanda Gold Mine

TO LEASE: In Cripple Creek, Colo., with tools and machinery. Production 897 tons in 1940. C. Krug, 2718 Woodburn Ave., Cincinnati, Ohio.

Arizona Copper Mine

CONSIDERABLE Blocked and large indicated tonnage 4 to 5% Ore. Privately owned, well located. Now operating and shipping. Outright sale or part interest to responsible party for further development and enlarged operation. BO-60, Engineering & Mining Journal, 330 W. 42nd St., New York, N. Y.

South American Gold Property

WE ARE OFFERING for sale 3000 hectareas of gold property in an unusually rich region in Southern Peru. There are large workings, complete camp, 35 ton mill, and hydroelectric plant on the property. Write for full particulars: Dr. Daniel Ruzo, 182 Portal Belen, Lima, Peru.

MERCURY PROPERTY

Covering about 80 acres in Mexico, with conservative estimate of 1½% quicksilver. Free of any encumbrances and close to Pan-American Highway. $40,000 capital will acquire partnership to exploit.

BO-57, Engineering & Mining Journal
330 West 42nd St., New York City

BUSINESS OPPORTUNITIES

Capital Wanted

MINERAL EXPLORATION and development organization operating in southern Appalachians wishes additional capital on cooperative basis. Details furnished to responsible parties after exchange of references. BO-58, Engineering & Mining Journal, 330 W. 42nd St., New York, N. Y.

White Gypsum

For Sale: Proven deposit, Western New York. High Grade White Gypsum; about 5 million tons; Railroad on property. BO-62, Engineering & Mining Journal, 330 W. 42nd St., New York, N. Y.

DIVIDEND NOTICE

ANACONDA COPPER MINING CO.
25 Broadway,
New York, N. Y., November 27, 1941.
DIVIDEND NO. 134

The Board of Directors of the Anaconda Copper Mining Company has declared a dividend of One Dollar ($1.00) per share upon its Capital Stock of the par value of $50. per share, payable December 22, 1941, to holders of such shares of record at the close of business at 3 o'clock P.M., on December 9, 1941.

JAS. DICKSON, Secretary & Treasurer

NATIONAL CLASSIFIED ADVERTISING

— at your service

for bringing business needs or "opportunities" to the attention of other men associated in executive management, sales and responsible technical, engineering and operating capacities with the industries served by:

The SEARCHLIGHT SECTIONS
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American Machinist
Aviation
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Engineering and Mining Journal
Engineering News-Record
E. & M. J. Markets
Factory Management and Maintenance
Food Industries
Power
Product Engineering
Textile World
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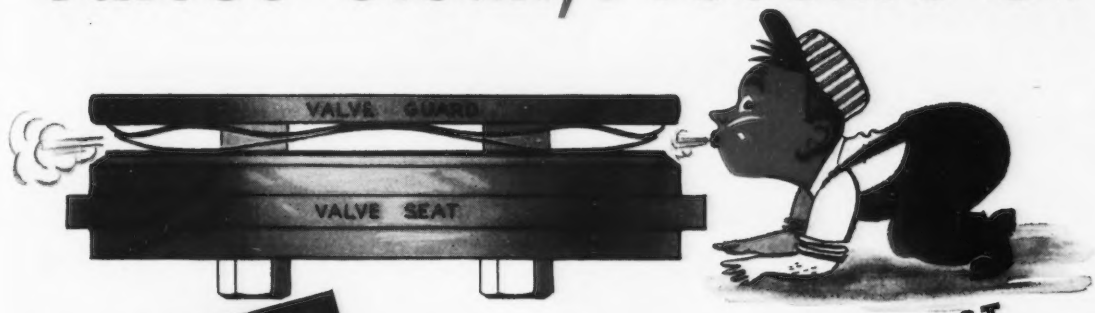
For advertising rates or other information, write:

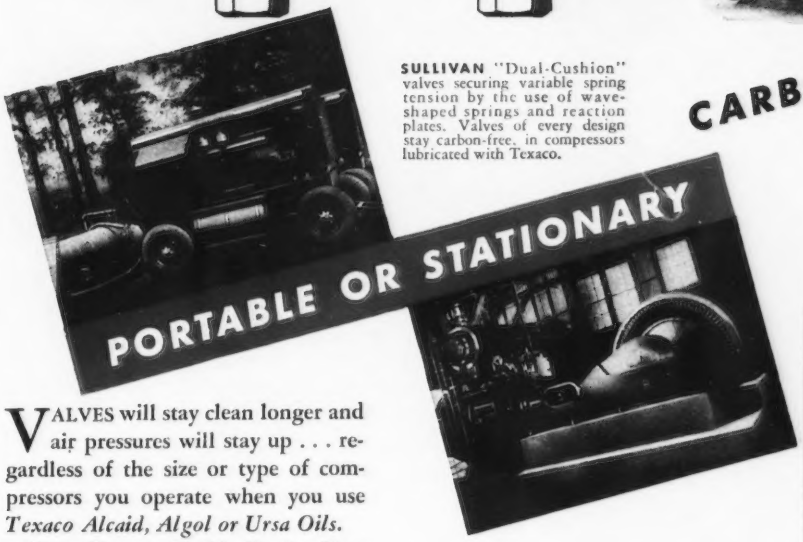
Departmental Staff
McGraw-Hill Publishing Co., Inc.
330 W. 42nd St., New York City

Valves Clean, Pressure UP!



SULLIVAN "Dual-Cushion" valves securing variable spring tension by the use of wave-shaped springs and reaction plates. Valves of every design stay carbon-free, in compressors lubricated with Texaco.

CARBON JUST BLOWS AWAY



VALVES will stay clean longer and air pressures will stay up . . . regardless of the size or type of compressors you operate when you use *Texaco Alcaid, Algol or Ursa Oils.*

Using *Texaco Alcaid, Algol or Ursa Oils* the little carbon that may form will be *soft* and *fluffy* . . . will be carried away with the compressed air. Highly resistant not only to carbon formation, but also to gumming and sludging, these oils assure efficient valves, longer service between inspections and cleanings.

Because of the savings Texaco brings—

More copper is produced in U. S. by mines using Texaco than by all other copper mines combined.

The outstanding performance that has made Texaco FIRST in the copper mining field has made it FIRST also in the fields listed in the panel.

These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

FOR YOUR ENJOYMENT • TWO GREAT RADIO PROGRAMS

FRED ALLEN every Wednesday night. See your local newspaper for time and station.

METROPOLITAN OPERA. Complete broadcasts of great operas every Saturday. See your local newspaper for time and station.

TEXACO REG. T.M.

TEXACO Lubricants and Fuels

FOR THE MINING INDUSTRY

RETURN METAL DRUMS PROMPTLY . . . thus helping to make present supply meet industry's needs and releasing metal for National Defense.

SEE HOW YOU

WITH THE

Extra Convenience Features

HELP YOU GET THE TRI/CLAD MOTOR INTO SERVICE FASTER . . . KEEP IT IN SERVICE WITH LESS ATTENTION.

Easy to Handle ▶

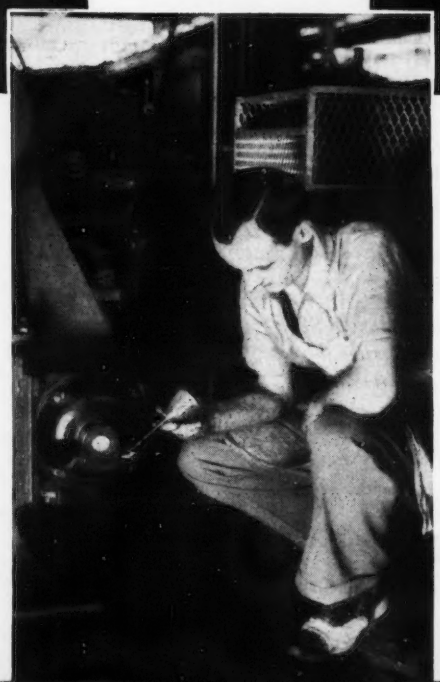
1. They can be moved into position easily because of their light weight and compactness. The shape of the bearing housings and the location of end-shield fittings make it easy to handle Tri-Clad motors with slings. In addition, they are sturdily built and do not have to be coddled.

Quickly Mounted or Altered ▶

2. Their feet are machined accurately and drilled for standard mounting bolts. The reversible stator puts the roomy conduit box on the most convenient side and the end shields can be rotated to any of four positions to meet mounting requirements.

◀ *Simple to Align*

4. Accurate alignment, with the minimum of shimming, is afforded by their rigid, cast-iron frame construction, close machining tolerances, and accurate milling of feet. Pinions, pulleys, or couplings can be properly fitted because of close machining of the shaft extension and convenient shoulders on the shaft.



◀ *Convenient to Lubricate*

5. Tri-Clad motors have a large oil or grease capacity. On sleeve-bearing motors, the oil-filler gage can be located on either side of the bearing housing. A spring cover on this gage permits quick checking of the oil level. On ball-bearing motors, a pressure-relief greasing system assures rapid and thorough greasing.

BUILT FOR PROTECTION FIRST . . . TO LAST

SAVE TIME

TRI-CLAD MOTOR

REG. U. S. PAT. OFF.

Easy to Wire

3. A large, four-position conduit box gives unrestricted working space. It can be quickly removed for wiring. Flexible leads are pressed on the terminals, which are permanently identified. No soldered connections are necessary. A stainless-steel, graphic connection plate is conveniently located on the conduit-box side of the motor.

Easy to Clean

6. The smooth, rounded contours of the Tri-Clad motor—with the upper portion completely enclosed—have few recesses or projections to catch and hold settling dust. Such dust as does settle on the motor can be readily wiped away with a cloth or piece of waste.

Extra Protection 3 Ways

HELPS ASSURE LONG SERVICE LIFE

Production interruptions are avoided and operating time is saved when the motor you buy can stand up under the many adverse operating conditions commonly found in industry. Tri-Clad motors meet these conditions with—

1. *Extra Protection* against physical damage
2. *Extra Protection* against electrical breakdown
3. *Extra Protection* against operating wear and tear

Write for Bulletin GEA-3580, which gives full details of these extra protection features and other Tri-Clad motor advantages.

THE new General Electric Tri-Clad motor is a cinch to install. Its convenience features pay off in precious minutes saved—both for those who build motors into machines and for those who use them in the plant.

Next time you order motors, take *time saving* into account, along with protection and performance; make sure you get Tri-Clad motors—now available in a wide range of types and integral horsepower sizes to 20 hp. General Electric Company, Schenectady, N. Y.

GENERAL ELECTRIC

Miami Copper Company

REPORTS ON TIMKEN ROCK BITS

The Miami Copper Company, using Timken Bits 100%, has only 11.5% as much steel in circulation as would be necessary with mine sharpened steel. No more than 900 drill rods are required to achieve today's all-out production. Studies reveal that to equal present production with forged steel approximately 7,500 rods would be needed. This figure is based on the additional footage drilled with Timken Bits and the shop-to-shop cycle.

By weight the transportation ratio is even more striking—4.15%; this includes weight of the bits and the few rods returned for reconditioning. With Timken Bits the steel stays right at the drilling face.

Because of war emergencies steel is on the critical list and it may become increasingly scarce. Timken Bits have radically reduced steel requirements at Miami Copper Company.

The Timken Roller Bearing Company believes that the value of the Timken Bit is greater today than ever before. If you have been thinking about testing Timken Bits don't you agree *now, right now,* is the time to act? A post card will bring us to your office. Address it to

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS

ROEBLING *Looks Ahead*

TO A SECOND CENTURY OF PIONEERING!

The past—despite its achievement—is *behind*. The opportunity to continue to grow, to further achieve, to serve industry in even greater measure, is *in the future*.

» » That is why Roebling—at the celebration of its 100th Anniversary—LOOKS AHEAD—looks ahead with confidence to new opportunities to Pioneer in Wire—new opportunities to develop the finest wire and wire products that aggressive research, unequalled experience, and the most modern of manufacturing facilities can make possible.

JOHN A. ROEBLING'S SONS COMPANY

TRENTON, NEW JERSEY

IT'S IN THE PLANNING!

The successful operation of your plant begins on the drafting board.

A WKE mill is systematically planned after a painstaking study of all metallurgical data available.

The plant is built after careful consideration of the flow sheet, of the available mill sites, of the tailings disposal, of the water supply, etc.

That is why the majority of important Western Mills are WKE designed and built, and that is why all WKE Mills operate successfully.

Send for our "Turn Key" Bulletin.

WESTERN KNAPP ENGINEERING CO.

CONSTRUCTION ENGINEERS - COMPLETE MINE AND MILL INSTALLATION

760 FOLSOM ST. SAN FRANCISCO

LOS ANGELES - SACRAMENTO - SALT LAKE CITY - SPOKANE - DENVER - PHOENIX

In these days . . .

would you buy a gasoline that would give you twice the mileage and power—?

Yes—and you would be glad to pay a premium price for it, too.

The same logic would apply to wire rope—and in that connection we offer—

HAZARD LAY-SET *Preformed*

● *Invariably*, Hazard LAY-SET Preformed will give far better and longer service, when compared with non-preformed rope. In many instances it has given much more than twice the service. The result is fewer machine shutdowns, steadier production, greater efficiency.

It is the preforming process which LAY-SET goes through at the mill that makes possible this superior service. Preforming relaxes the wires —relieves them of pent-up stresses—gives the rope extreme resistance to bending fatigue. It makes LAY-SET resist kinking and twisting; makes it easier, faster and safer to handle. It obviates the necessity for seizing the ends when being cut.

For longer and better rope service, for less "outage time" for machines and men, for greater safety to workmen—specify Hazard LAY-SET Preformed. All Hazard ropes identified by the Green Strand are made of Improved Plow Steel.

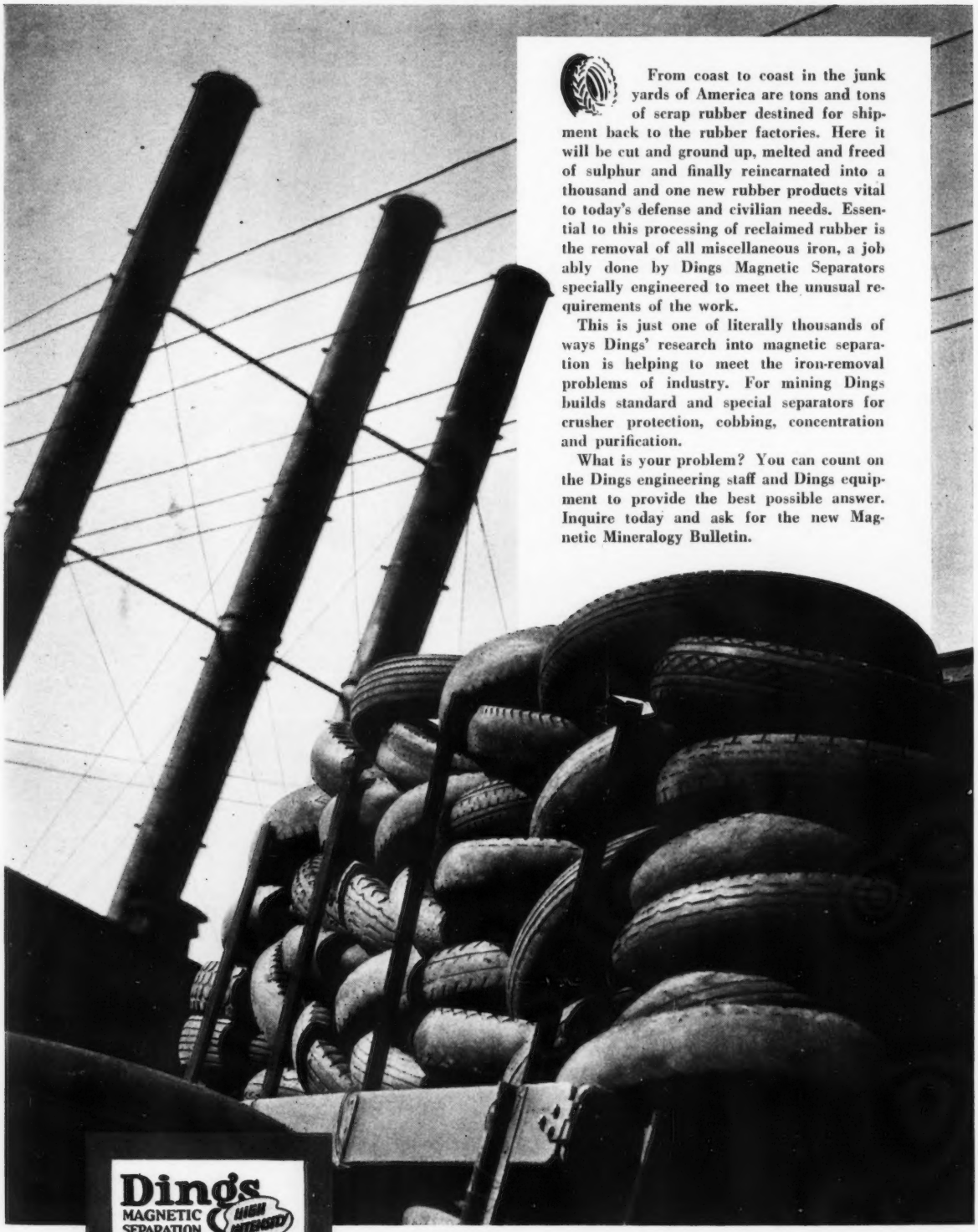
HAZARD WIRE ROPE DIVISION • WILKES-BARRE, PENNSYLVANIA

Established 1846

AMERICAN CHAIN & CABLE COMPANY, INC.

District Offices: New York, Chicago, Philadelphia, Pittsburgh, Fort Worth, San Francisco, Denver, Los Angeles, Atlanta, Tacoma

SCHEDULED FOR REINCARNATION



From coast to coast in the junk yards of America are tons and tons of scrap rubber destined for shipment back to the rubber factories. Here it will be cut and ground up, melted and freed of sulphur and finally reincarnated into a thousand and one new rubber products vital to today's defense and civilian needs. Essential to this processing of reclaimed rubber is the removal of all miscellaneous iron, a job ably done by Dings Magnetic Separators specially engineered to meet the unusual requirements of the work.

This is just one of literally thousands of ways Dings' research into magnetic separation is helping to meet the iron-removal problems of industry. For mining Dings builds standard and special separators for crusher protection, cobbing, concentration and purification.

What is your problem? You can count on the Dings engineering staff and Dings equipment to provide the best possible answer. Inquire today and ask for the new Magnetic Mineralogy Bulletin.

Dings MAGNETIC SEPARATION HIGH INTENSITY

THE DINGS MAGNETIC SEPARATOR CO., 514 E. Smith St., Milwaukee, Wis.

DESIGN FOR TIMBER

And Forget Priorities

GET THIS FREE BOOK

Here are listed 470 typical patterns to help you replace critical list materials with timber construction. . . . Triangular roof trusses . . . scissors and cambered fink roof trusses . . . flat roof trusses . . . bowstring roof trusses . . . factory roof trusses . . . barn trusses and farm buildings . . . grandstands . . . distillery warehouse barrel racks . . . bridges and trestles . . . radio, tank, and lookout towers . . . airplane hangars . . . and they contain ideas for many others not directly represented.

Expert timber fabricating firms are ready to help you. . . . On some recent rush jobs prefabricated timber trusses by the carload have been sped 2,000 miles to job sites. . . . Others have gone nearby by truck.

TIMBER ENGINEERING COMPANY, Inc.
Dept. AS-12 1337 Connecticut Avenue
WASHINGTON, D. C.

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TIMBER ENGINEERING COMPANY, Inc., Dept. AS-12
1337 Connecticut Avenue, Washington, D. C.

☐ Send me FREE booklet, "Typical Lumber Designs."
☐ Have the nearest TECO Timber Fabricator get in touch with me without obligation on my part.

We plan to build (type of structure) .....
Individual .....
Firm .....
Street .....
City ..... State .....

A new

Cross section of a Bethlehem-Dardelet Rivet-Bolt showing the ribbed grip section and the self-locking threads.

Bethlehem-Dardelet Rivet-Bolts being installed on a construction job.

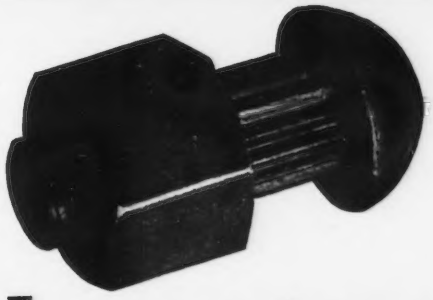
More feet of hole per inch of rod—The Carleton Tunnel, which drains the famous Cripple Creek gold mine is evidence that Bethlehem's Superior Hollow Drill Steel holes through faster and cheaper. Many tons of Bethlehem Superior were used on this project.

The reasons why Superior Hollow Drill turns in this rapid-fire, low-cost performance every day are simple. First, Bethlehem Superior is made of a special, fatigue-resisting steel, tough, clean and pre-tested to insure uniform response to heat treating. Second, the hole in Superior is accurately centered and free from pits or cracks that might eventually cause fatigue failures.

Big, tough, Bethlehem wire ropes for safe shaft operation—Carrying cages of men up and down miles of shaft requires the longest-lasting, safest wire rope that science can produce. It must be made from the strongest steel and it must be used in sizes large enough to afford the correct factor of safety.

That's why Bethlehem Purple Strand Shaft Rope is used in many of the country's deepest and busiest mines. Purple Strand's construction was developed by Bethlehem's engineers working in collaboration with mine operators. It is made from Improved Plow Steel, the toughest, strongest, most durable steel used in any rope manufacture. Bethlehem produces this superior grade of rope in diameters ranging up to and beyond 3 inches.

twist to



rapid steel construction--

BETHLEHEM RIVET-BOLTS

A few blows with a maul, a few twists with a wrench and a Bethlehem-Dardelet Rivet-Bolt is securely fastened. This method is now speeding steel erection on many new mine structures including buildings, conveyors, headframes and dredges.

Bethlehem-Dardelet Rivet-Bolts save time; as many as 19 have been installed per man-hour. They require little equipment; a maul and a wrench do the job. No forges or compressed air are needed. They require few workmen; a crew can install Bethlehem rivet-bolts in addition to handling the preliminary bolting-up of the structural steel.

This bolt holds fast permanently because it has a ribbed grip section with an outside diameter slightly greater than the hole into which the bolt is driven. The nut holds fast because its unique Dardelet thread locks securely to the bolt when wrench-pressure is applied.

Bethlehem-Dardelet Rivet-Bolts are made with button-head, countersunk and special heads.

A mine-car wheel that has never failed—Wheel failure cut to zero—that's the experience of many progressive mine operators who now use Bethlehem forged-steel wheels. These wheels have been rolling up a perfect record since 1927 when they were first placed on the market; to date, not one flange or tread has ever cracked, chipped or broken in service.

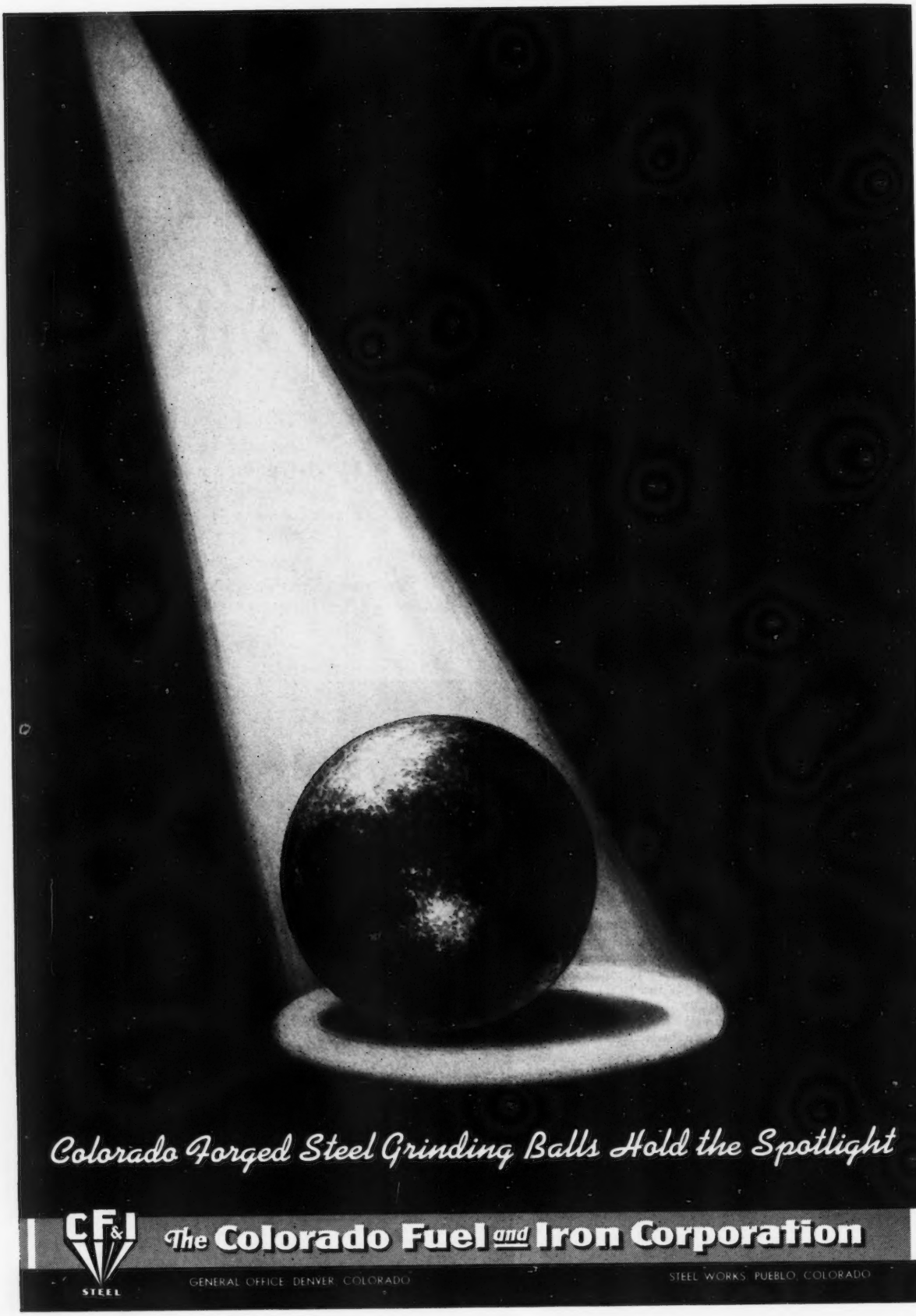
Bethlehem wheels are made from a special grade of highly uniform open hearth steel. A thorough forging process gives them far greater strength, toughness and resilience than are found in other types of wheels. They are designed for use with tapered roller bearings and can be machined readily for use with any standard anti-friction bearings.

Bolts, nuts, spikes, rivets for tight, durable fastening—Adequate wrench pressure can be put on Bethlehem mine-track bolts and hot-forged nuts without danger of stripping threads. They draw up tightly without failure, because they're made in the correct sizes for every track weight from 12 lbs. to 60 lbs. Any Bethlehem bolt can be easily identified by the "A" on its head.

Bethlehem track spikes drive easily and hold fast due to their clean-cut points and full heads. They are made from new-billet steel exclusively.

Bethlehem rivets are available in all sizes and all head designs for mine repair and maintenance work. They're made in the usual tensile-strength ranges also in special ranges when required.

BETHLEHEM STEEL

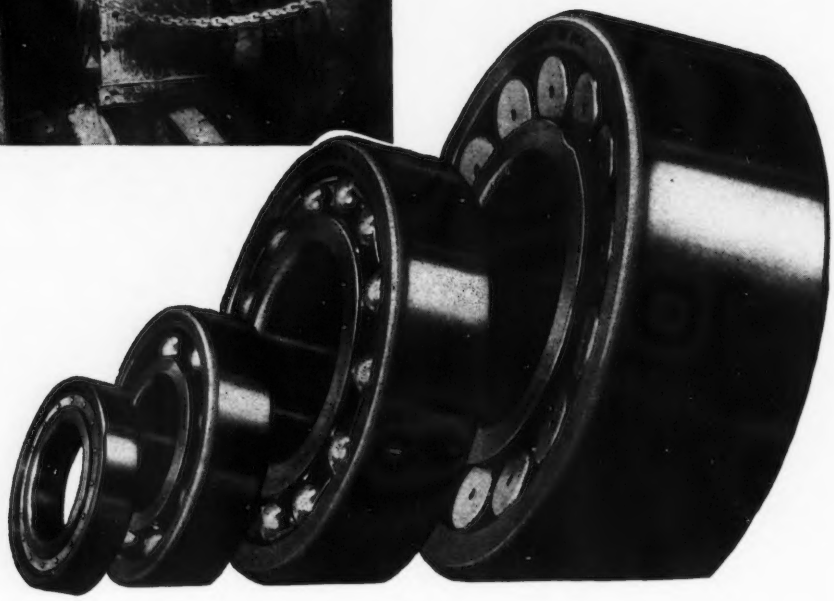

Colorado Forged Steel Grinding Balls Hold the Spotlight
CF&I
STEEL
The Colorado Fuel and Iron Corporation
GENERAL OFFICE DENVER, COLORADO
STEEL WORKS PUEBLO, COLORADO

NICKEL

Practical answers to many questions about the selection, fabrication and uses of Nickel alloys are quickly available to you. This helpful information we have gathered, checked and condensed into convenient printed form. It is useful both to experienced men handling new materials or performing unfamiliar operations... and to new employees. This literature is available upon request. You are also offered the assistance of our technical staff in solving material problems arising from a temporary lack of Nickel. Our engineers are offering timely suggestions to many vital industries during the present emergency. Your request for literature or personal consultation will receive our prompt attention.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

Keep COPPER *Moving for Defense*



WE USE SKF BEARINGS

GENERAL ELECTRIC CO.

Speeding raw materials from working face to surface in the Butte mine of The Anaconda Copper Company is another one of those vital defense jobs on which SKF Bearings work. On the motor armature of this G.E. 5½-ton locomotive, for instance, they save 20% of motor overall length, *keep* a uniform air gap, and reduce lubrication and maintenance to an absolute minimum. Another example of how *bearing* performance plays a big part in *defense* performance.

4928

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

SKF
ball and roller
BEARINGS

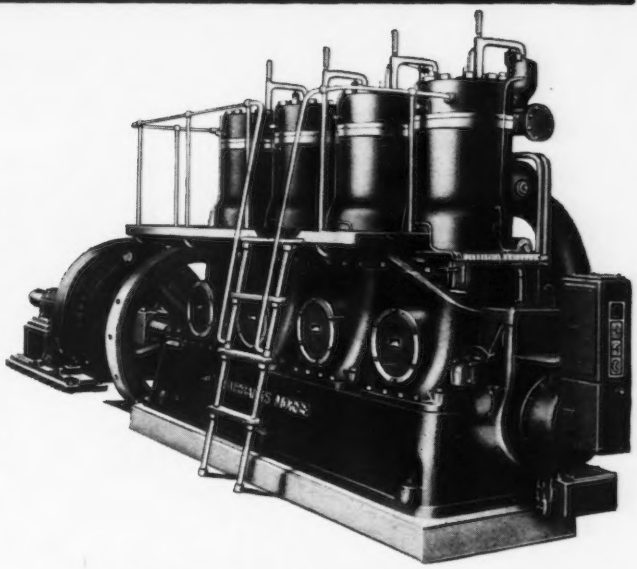
LOW COST POWER

...wherever you are...whenever you want it... and always under YOUR control!

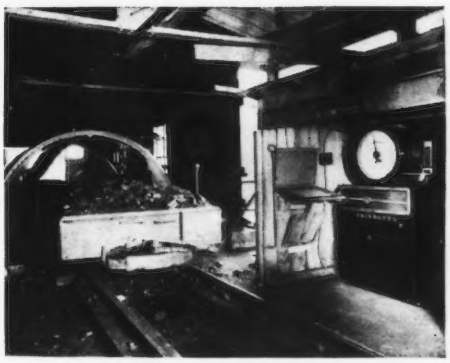
It doesn't make any difference whether your mining operation is located 100 yards or 100 miles from a "high-line," Fairbanks-Morse Diesels offer you low cost electric power that is as famous for dependability as it is for *low cost.* With the labor cost of mining steadily *advancing,* the fact that you probably can *reduce* power cost sensationally by generating your own with a Fairbanks-Morse Diesel certainly merits investigation.

Experienced F-M engineers, familiar with the problems of your part of the country and your type of operation, work with your present cost figures and show you with amazing accuracy what F-M Diesel generated electric power will gain for you.

This service does not obligate you in any way. Write us about it now. Address Fairbanks, Morse & Co., Dept. L-28, 600 South Michigan Ave., Chicago, Ill. Branches and service stations throughout the United States and Canada.



Model 32 Fairbanks-Morse Diesel-generator requires no special construction, no heavy installation expense, no constant attention after installed. F-M Diesels use fuel oil which is in the nature of a by-product of many gasoline refineries. Hence it is always cheap and plentiful.



Fairbanks *Motion Weighing* Mine Car Scale

. . . and scales that increase profits on every ton by weighing car loads on the run

A loaded car rolls onto the platform of a Fairbanks Mine Car Scale. Click--click! Wheels of the car activate the electrical tripping device. The scale is in operation. Automatically the Printomatic Weigher makes a printed record of the weight and provides a designating number that shows *who dug it!* The interests of miner and company are both protected.

The mechanism of the scale insures a high degree of sensitiveness and is especially adapted to motion weighing by knowledge gained through more than a century of scale-building experience.

FAIRBANKS, MORSE & CO.

Power • Pumping & Weighing Equipment

COTTRELL PROCESS

of

ELECTRICAL PRECIPITATION

universally recognized as a standard method of removing

DUST, FLY ASH, FUME, MIST & FOG

***from* GASES**

•

29 years of research development and operating experience by the affiliated Cottrell Companies throughout the world is incorporated in the

COTTRELL INSTALLATIONS

offered to meet the requirements of any problem by

RESEARCH CORPORATION

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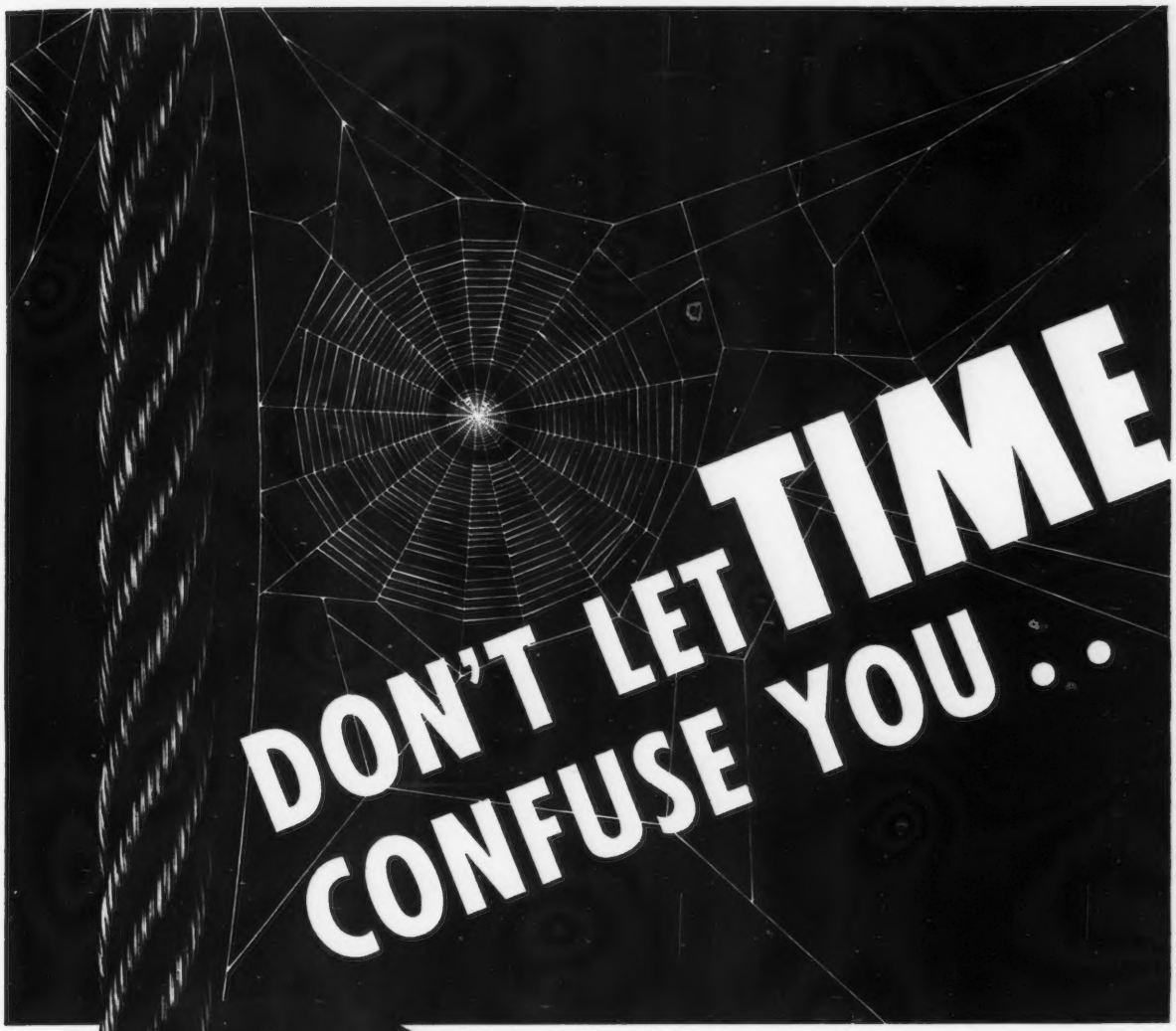


WICKWIRE ROPE

Use, not time, destroys wire rope. The oil man must think in terms of foot-hole-drilled, the building manager elevator car-miles-traveled, the logger the per-thousand-feet of lumber, the mine and sand or gravel operator per-ton or per-yard of material moved. The unit-of-use cost method is the only sound way of evaluating wire rope. It's the method we want you to use when passing judgment on Wickwire Rope. Our bid for your future business is the lower per-unit-of-use cost that you will get from Wickwire Rope.

WICKWIRE SPENCER STEEL COMPANY

General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

TO COMPETE WITH auto traffic at stop lights, trolley car "pick-up" was stepped up. Resulting overload on motors, operating under tough conditions, required *yearly* dismantling for repairs. Since being insulated with Fiberglas, motors have run *3 years* without failure, expected to run *4 more years!* Maintenance saving estimated at 40%.

Does this mean Fiberglas is a motor "Cure-all"?

THIS and many other spectacular examples of improved motor performance made possible with Fiberglas might lead to the conclusion in the minds of some that Fiberglas is indeed a motor "cure-all." This is especially true in these times of overworked equipment and resulting breakdowns.

However—we the makers of Fiberglas make no exaggerated claims that its use automatically corrects all motor failures. It must be properly incorporated into the design of the motor and its application carefully controlled to fully utilize these basic advantages.

Fiberglas has a considerably greater margin of safety than cotton and a demonstrated longer life under high temperature conditions than asbestos. This means that your present equipment, re-wound with Fiberglas, can better withstand excessive loads for abnormal periods of time without insulation failure.

Reinsulating Class A Equipment, Fiberglas permits a safe increase in horsepower output, because it allows higher operating temperatures.

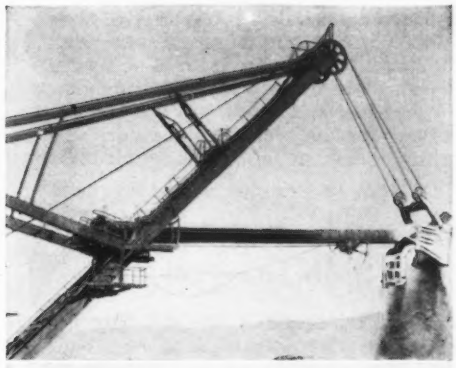
Apply these two Fiberglas advantages to motors or generators, and, in general, you secure added protection against breakdowns—wise insurance in these days of continuous three shift production. Specify Fiberglas to your repair shop. Order Fiberglas-insulated equipment from your manufacturer. *Owens-Corning Fiberglas Corporation, Toledo, Ohio. In Canada, Fiberglas Canada, Ltd., Oshawa, Ontario.*

*T. M. Reg. U. S. Pat. Off.

OWENS-CORNING

FIBERGLAS

EXTRA Tough . . .
EXTRA Flexible . . .
MONARCH PRE-FORMED
made from
2 KINDS OF WIRE



INNER WIRES ARE EXTREMELY FLEXIBLE. They're drawn in a special way to make them extra strong, extra pliable. They're improved plow steel too. They bend easily over your sheaves and drums. These wires are the reserve strength of Monarch Whyte Strand PREformed.

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And then to provide for EXTRA long life, every wire in Monarch Whyte Strand is thoroughly covered with a special lubricant which protects unseen, inside surfaces against corrosion and friction. This better wire rope is available from stock in the correct size, grade and construction.

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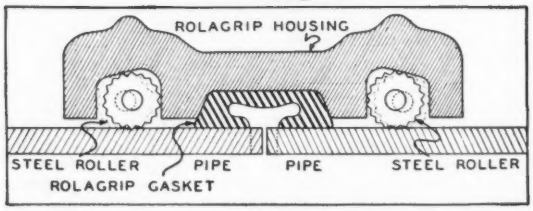
The correct ropes for your equipment

PRE-FORMED FOR BEST PERFORMANCE

You Can't Get New Pipe?

...KEEP YOUR OLD IN USE WITH—

ROLAGRIP



Only three parts—two bolts. No special tools or trained men required for quick Rolagrip installations. Couplings can be completely salvaged.

PIPE COUPLINGS

For Plain End Connections

Cut away the worn threads and damaged ends from your old pipe, and put it into service with Rolagrip Couplings. No threads, grooves or special ends are needed with these leakproof couplings. Suitable for connections in open pit and underground operations for air, water, salt water, acid water, concentrate, gas or oil lines, vertical or horizontal.

Make Plain End Pipe Hold High End-Pull

Rolagrips overcome the threat of joint pull-outs and line breakage where pipe is subject to high end-pulls from pressure or other forces. Because of flexibility, Rolagrip-coupled joints better resist breakage from explosive shots. Made for pipe diameters from 2" to 12"; rubber and synthetic gaskets available.

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GUSTIN-BACON MFG. CO.

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Out of Today's Emergency—

BETTER REPUBLIC STEELS FOR TOMORROW!

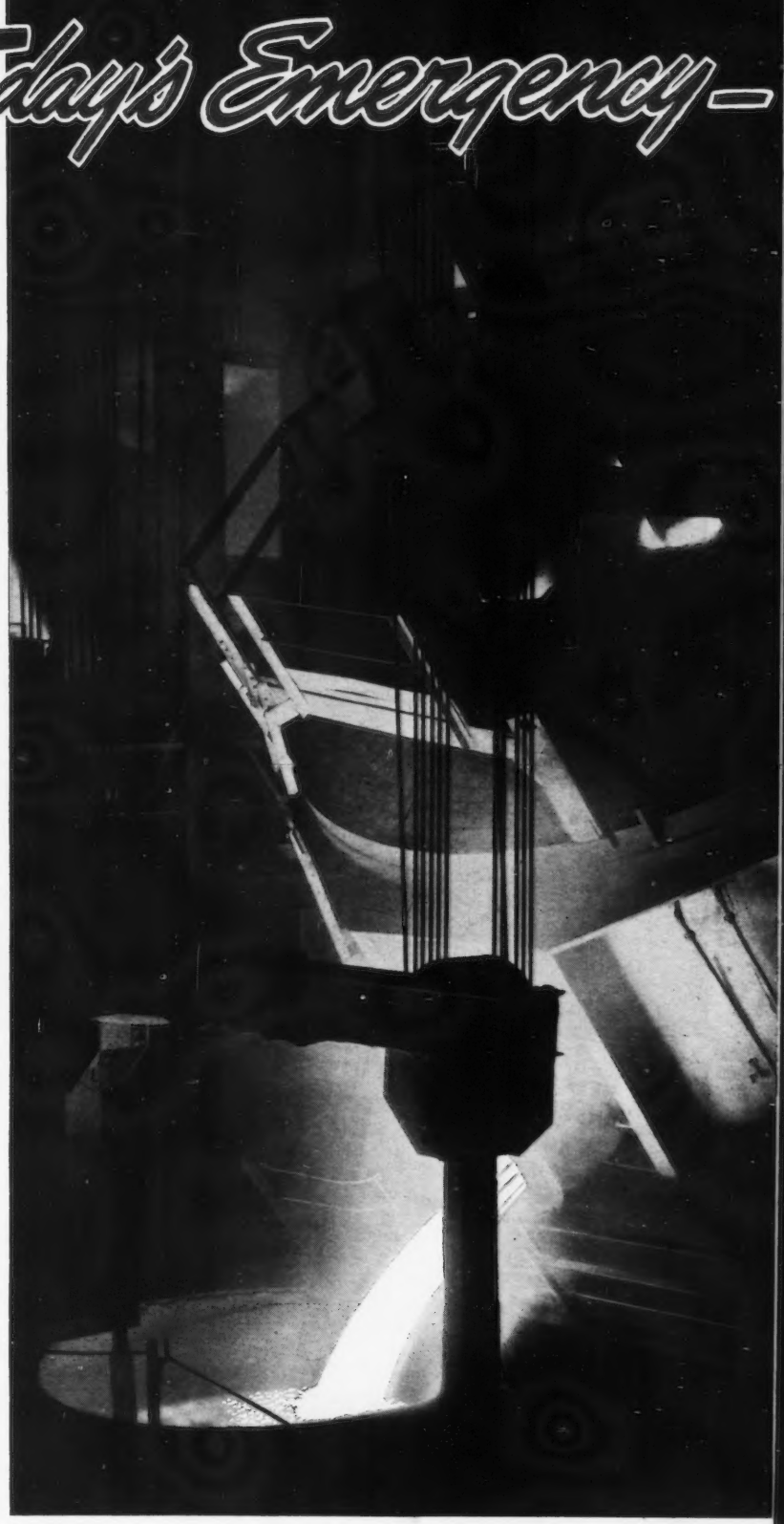
Bombers must fly higher and farther — pursuit planes faster. Guns must withstand more rapid fire. Tanks must be more dependable in swift maneuver — battleships better protected.

Demands like these call for the finest steels ever produced—for new steels, improved steels—in tremendous quantities.

Anticipating this need, Republic — already the world's largest producer of alloy and stainless steels—has jumped its electric furnace capacity in the last two years from *146,000 to 720,000 tons a year.* Right now, Republic is increasing its plate capacity to 600,000 tons a year —a rise of 58%. Annual pig iron capacity will be increased 36%—to 6,620,000 tons. A new armor plate plant already is in active production. And Republic research, famous for its achievements, has been greatly intensified.

When a peace-time tomorrow arrives, the steels which enable us to build faster warplanes, stronger tanks, guns and battleships will mean safer, swifter transport and private airplanes — finer automobiles, trucks, railroad trains and machinery — even better washing machines, refrigerators, stoves and thousands of other products in which steel makes life more livable, more comfortable, more enjoyable.

And when that tomorrow comes, Republic will be ready to produce these steels in quantities sufficient for everyone.



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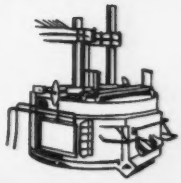
REPUBLIC STEEL — DEFENSE FOR AMERICA

Anticipating the growing need for electric furnace steels, Republic has increased its electric furnace capacity approximately 500% in the last two years.

IN 1939
146,000 TONS ANNUAL CAPACITY

IN 1941
720,000 TONS ANNUAL CAPACITY



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Abrasion Resistance superior to the best impregnated cotton coverings formerly used.

Electrical Properties equal to those of enameled wire.

Bright colors—yellow on one wire, red on the other—this insulation stays clean, making wires easier to identify under field conditions.

2. RUBBER PLUG CLOSURE for...

Water resistance even greater than the former standards for *waterproof* electric blasting caps —always the same, regardless of temperature.

Shorter cap shells for easier, safer priming (1⅛" shorter than Du Pont Delays using the old type closure).

BEFORE you buy delay electric blasting caps be sure to look at Du Pont Delays. You'll find all of the standard features demanded of a modern delay, plus two of the latest developments of du Pont research—a new plastic insulation and a rubber plug closure.

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E. I. du Pont de Nemours & Co. (Inc.)
Explosives Dept., Wilmington, Del.

DUPONT REG. U.S. PAT. OFF. **EXPLOSIVES** *and* **BLASTING ACCESSORIES**

HELPFUL HINTS ON CHOOSING VALVES FOR BETTER PIPING SERVICE
PLEASE CHECK AND PASS ON
While this bulletin is written primarily for the guidance of maintenance workers, its purpose and its contents may also be of interest to:
General Supt.
Supt. of Maintenance
Maintenance Foreman
Master Mechanic
Foreman Pipe Fitter
Storekeeper
POST ON SHOP BULLETIN BOARD
AN AID TO DEFENSE
No. 3 of a series of bulletins designed to help industrial maintenance men keep piping systems working at peak efficiency. Issued by Crane Co.; distributed by Crane Representatives

Shop Bulletin No. 1 gives hints on handling valves and fittings; No. 2 shows pointers on piping placement. Ask your Crane Representative to explain how you can get valuable aid from this practical service.

Ready for you...

CRANE SHOP BULLETIN NO. 3

It's ready—to help you keep pipe lines in peak condition for peak production—to help you get maximum service from present equipment. This timely Crane Shop Bulletin Service is designed to aid you in training new maintenance men; and to caution experienced workers on piping fundamentals often overlooked with costly results. Bulletin No. 3 gives many valuable hints on the proper selection and usage of valves. Copies for distribution to your piping crews may be had from your Crane Representative—or by writing to us.

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THE EAGLE LOG WASHER

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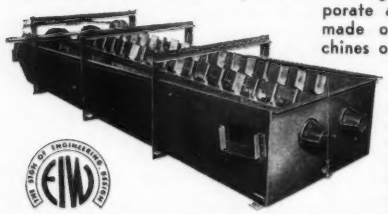

Write for Catalog . . . better still, let us study your problem and suggest the type of equipment that will best meet your requirements. Test reports rendered on samples.

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—and easy-to-learn

—and amusing!

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MIDVALE

Defense Savings Pay-Roll Allotment Plan

How company heads can help their country, their employees, and themselves

voluntary pay-roll allotment plan

helps workers provide for the future

helps build future buying power

helps defend America today

This is no charity plea. It is a sound business proposition that vitally concerns the present and future welfare of your company, your employees, and yourself.

During the post-war period of readjustment, you may be faced with the unpleasant necessity of turning employees out into a confused and cheerless world. But you, as an employer, can do something *now* to help shape the destinies of your people. Scores of business heads have adopted the Voluntary Pay-roll Allotment Plan as a simple and easy way for every worker in the land to start a *systematic* and *continuous* Defense Bond savings program.

Many benefits . . . present and future. It is more than a sensible step toward reducing the ranks of the post-war needy. It will help spread financial participation in National Defense among all of America's wage earners.

The widespread use of this plan will materially retard inflation. It will "store" part of our pyramiding national income that would otherwise be spent as fast as it's earned, increasing the demand for our diminishing supply of consumer goods.

And don't overlook the immediate benefit . . . money for defense materials, quickly, continuously, *willingly*.

Let's do it the American way! America's talent for working out emergency problems, democratically, is being tested today. As always, we will work it out, without pressure or coercion . . . in that old American way; each businessman strengthening his *own* house; not waiting for his neighbor to do it. That custom has, throughout history, enabled America to get things done *of its own free will*.

In emergencies, America doesn't do things "hit-or-miss." We would get there *eventually* if we just left it to everybody's whim to buy Defense Bonds when they thought of it. But we're a nation of businessmen who understand that the way to get a thing done is to *systematize* the operation. That is why so many employers are getting back of this Voluntary Savings Plan.

Like most efficient systems, it is amazingly simple. All you have to do is offer your employees the convenience of having a fixed sum allotted, from each pay envelope, to the purchase of Defense Bonds. The employer holds these funds in a separate bank account, and delivers a Bond to the employee each time his allotments accumulate to a sufficient amount.

Each employee who chooses to start this savings plan decides for himself the denomination of the Bonds to be purchased and the amount to be allotted from his wages each pay day.

How big does a company have to be? From three employees on up. Size has nothing to do with it. It works equally well in stores, schools, publishing houses, factories, or banks. This whole idea of pay-roll allotment has been evolved by businessmen in cooperation with the Treasury Department. Each organization adopts its own simple, efficient application of the idea in accordance with the needs of its own set-up

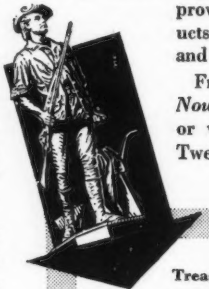
No chore at all. The system is so simple that A. T. & T. uses exactly the same easy card system that is being used by hundreds of companies having fewer than 25 employees! It is simple enough to be handled by a check-mark on a card each pay day.

Plenty of help available. Although this is *your* plan when you put it into effect, the Treasury Department is ready and willing to give you all kinds of help. Local civilian committees in 48 States are set up to have experienced men work with you just as much as you want them to, and no more.

Truly, about all *you* have to do is to indicate your willingness to get your organization started. We will supply most of the necessary material, and no end of help.

The first step is to take a closer look. Sending in the coupon in no way obligates you to install the Plan. It will simply give you a chance to scrutinize the available material and see what other companies are already doing. It will bring you samples of literature explaining the benefits to employees and describing the various denominations of Defense Savings Bonds that can be purchased through the Plan.

Sending the coupon does nothing more than signify that you are anxious to do *something* to help keep your people off relief when defense production sloughs off; *something* to enable *all* wage earners to participate in financing Defense; *something* to provide tomorrow's buying power for your products; *something* to get money *right now* for guns and tanks and planes and ships.



France left it to "hit-or-miss" . . . and *missed*. *Now* is the time for *you* to act! Mail the coupon or write Treasury Department, Section A, 709 Twelfth St. NW., Washington, D. C.

FREE - NO OBLIGATION

Treasury Department, Section A,
709 Twelfth St. NW., Washington, D. C.

Please send me the free kit of material being used by companies that have installed the Voluntary Defense Savings Pay-Roll Allotment Plan.

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Position _____

Company _____

Address _____

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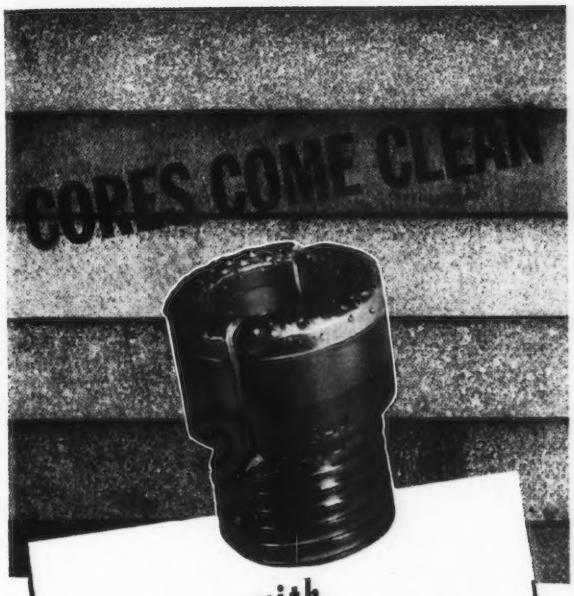

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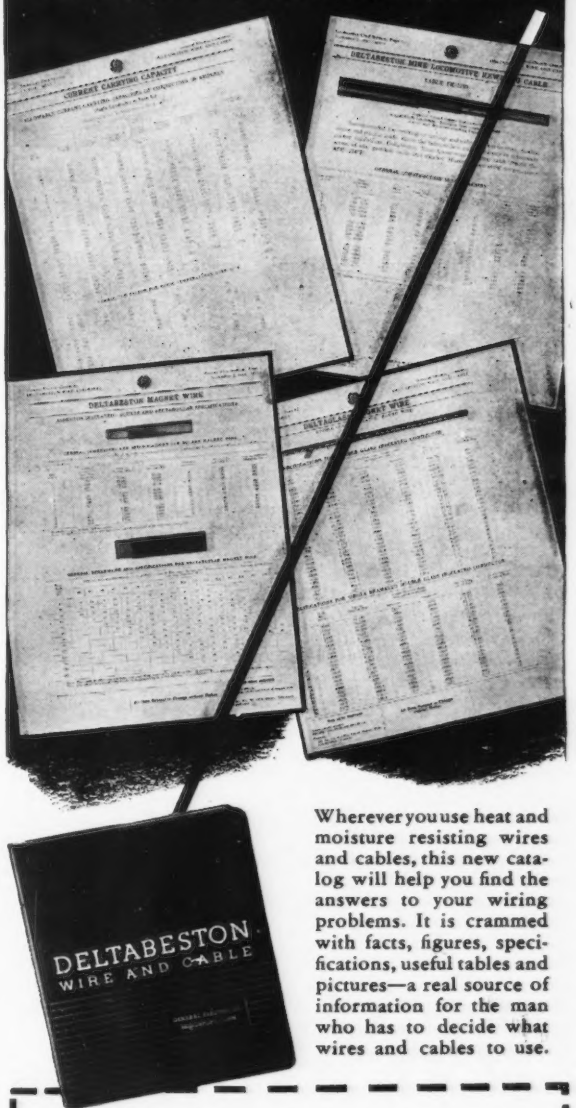
Where Heat Is a Problem in Wiring for the Mine— *Consult the New* DELTABESTON CATALOG



Wherever you use heat and moisture resisting wires and cables, this new catalog will help you find the answers to your wiring problems. It is crammed with facts, figures, specifications, useful tables and pictures—a real source of information for the man who has to decide what wires and cables to use.

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Bridgeport, Conn.

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GENERAL ELECTRIC

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Call Ryerson for prompt delivery of uniform high quality steels—many of which are specially developed for mining applications. (Ry-Ax for mine locomotive axles, Ryerson Abrasion Resisting Sheets & Plates for shaker screens, loader heads, etc.) Write for Stock List.

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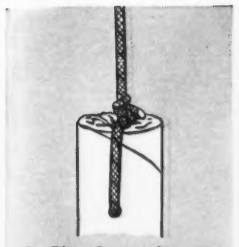
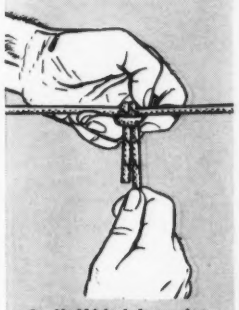
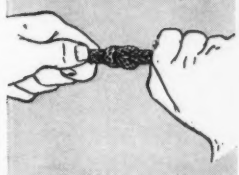


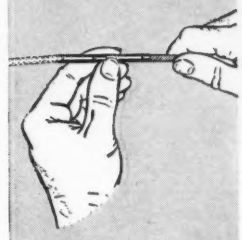
1. Tie through cartridge.



2. Half hitch branch to main line.



3. Connect main line lengths with *square* knot.



4. Fuse and cap on end of main line.

IMPORTANT

Branch lines should lead away from main lines at *right angles*. Avoid kinks and small loops.

Equipment moved LESS often

It *costs money* to remove track, pipe lines, shovels, and all the other equipment that must be out of the way when a blast *goes*. It *saves money* when you can do this *once* instead of two or more times.

How? By using Primacord to detonate and connect *more holes*. With Primacord-Bickford Detonating Fuse you can fire one hole or *a thousand* in one perfect blast. Fewer but bigger shots may hold some real economies for you. Write for the Primacord Book.

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A typical example of Goodrich development in rubber

THEY used to say "You can tell a member of the tank corps by his broken nose." Lurching, crashing over ditches, stumps, rocks, the crew were hurled against the steel walls so that often in 15 miles of cross-country travel sprains, cuts, broken bones made the crew casualties — they might arrive at the scene of battle unfit to fight.

A Goodrich engineer wondered why they couldn't cover the sharp, dangerous parts of the interior with sponge rubber. He found the army already had this idea but they told him the light, soft sponge tore out too soon or was gouged away.

How protect the rubber so it could protect the men? Goodrich had developed a process of depositing a rubber skin on anything dipped in a bath of liquid rubber. It is called the "Anode" process. Sheets of sponge rubber were put in this bath, a soft skin of rubber as elastic and strong as an inner tube was deposited on the surface.

This coated sponge was then attached inside the tank's turrets, hatches, and all other dangerous points. It worked perfectly. The rubber "skin" protects the soft sponge from gouging and itself adds to the cushioning effect. And since this skin traps the air in the sponge rubber cells, the sponge becomes a pneumatic cushion with added protective softness.

Now big tanks will travel with greater safety and comfort for the crews by using this new "upholstery." *The B. F. Goodrich Company, Mechanical Goods Division, Akron, Ohio.*

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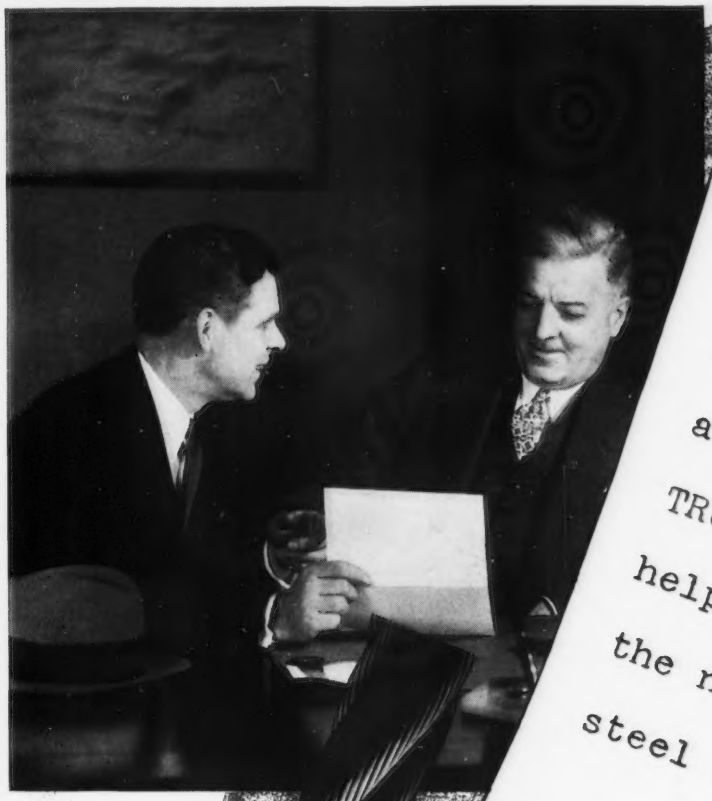

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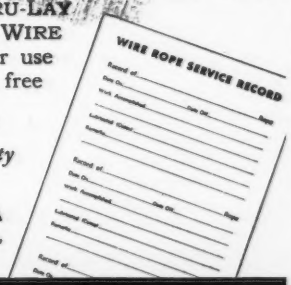

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